

Preliminary Design Report

Johnson Road Bridge #5792

over

Interstate 295

Falmouth, Maine

STP-02172(100)

WIN 21721.00



**Maine Department of Transportation
Bridge Program**

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BACKGROUND INFORMATION

TOWN	Falmouth	WIN	21721.00	BRIDGE NO.	5792
BRIDGE	Johnson Road Bridge			STATE ROUTE	N/A
FUNDING:	State				
PROGRAM SCOPE:	Bridge Rehabilitation				
PROGRAM DESCRIPTION:	Rehabilitation of Johnson Road/I-295 Bridge (No. 5792) over Interstate 295, located 0.25 of a mile west of Route 1.				
PROJECT BACKGROUND:	This bridge was constructed in 1957 with minor rehabilitation work completed in 1991. The deck is currently in fair condition while the substructure is in poor condition with signs of advanced deterioration.				
	JURISDICTION	State Highway		NHS	No
FUNCTIONAL CLASSIFICATION	Local Road		CORRIDOR PRIORITY	6	
	URBAN/RURAL	Rural		FHWA SUFFICIENCY RATING	35.5
	LOAD POSTING	Open, no restriction		POSTED SPEED	35 mph
TRAFFIC:	2016	AADT	1,440	ACCIDENT DATA, CRF	0.19
	2036	AADT	1,730	DHV	190

EXISTING BRIDGE

YEAR BUILT 1957 **SPAN LENGTHS** 39.75'-59'-59'-62' **CURB TO CURB WIDTH** 26'

TYPE OF SUPERSTRUCTURE: Four-Span Bridge composed of two separate superstructures as follows: A one-Span non-composite steel beam superstructure and a three-span continuous steel beam superstructure with both composite and noncomposite sections. The bridge has a cast-in-place deck and painted steel beams and bituminous wearing surface. Bridge rails consist of 1' wide concrete parapets topped by aluminum alloy guardrail.

GENERAL CONDITION: Steel beams are in generally satisfactory condition (6) with prevalent light rusting. Concrete deck is in fair condition (5) with minor transverse cracking with light efflorescent staining and isolated delamination and spalling with exposed rebar. Wearing surface has minor to moderate alligator cracking.

TYPE OF SUBSTRUCTURE: Concrete stub abutments on H-piles. Concrete 3-column piers on H-piles.

GENERAL CONDITION: The substructure is in poor condition (4). Abutments and wingwalls have scattered minor cracking. West pier cap has prevalent moderate cracking and isolated areas of spalled and delaminated concrete and shear cracking at the north face bearing area. West pier bearings are severely misaligned and are in need of rehabilitation.

LOAD RATINGS:

HL-93 Truck
Rating Factor

OPERATING

27.72 Tons
0.77

INVENTORY

21.24 Tons
0.59

LEGAL LOADS

Controlling Configuration:
Rating Factor
Controlling Member:

Configuration 3
0.83
Interior Girder (Negative Moment over Pier 3)

STRUCTURALLY DEFICIENT Yes

FUNCTIONALLY OBSOLETE Yes

MAINTENANCE PROBLEMS: Maintenance issues include deterioration of the bituminous wearing surface, vehicular damage of the West end bridge rail, cracking and exposed rebar on the underside of the deck, misaligned bearings at the West Pier and cracking and deterioration of pier columns and abutment backwalls.

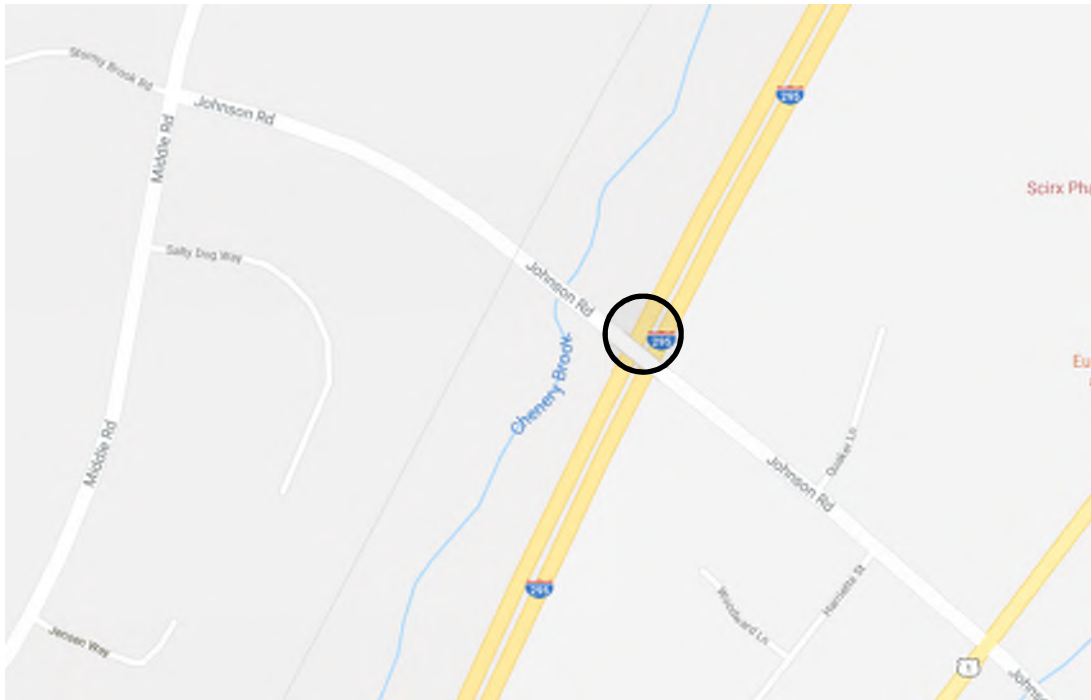
MAINTENANCE WORK: Evidence of patching on piers.

PREVIOUS STRUCTURE: Original structure

OTHER COMMENTS: None

LOCATION MAP

Falmouth, Johnson Road Bridge #5792, WIN 21721.00
Johnson Road over Interstate 295



Latitude: 43° 44' 32.19" N, Longitude: 70° 13' 27.2" W

BRIDGE RECOMMENDATION FORM

TOWN	Falmouth	BRIDGE	Johnson Road Bridge	BRIDGE NO.	5792
DESIGNED BY	WSP	DATE	12/12/2018	WIN	21721.00
APPROVED BY	_____	DATE	_____	STATE ROUTE	N/A
APPROVED BY	_____	DATE	_____		

PROJECT: Complete bridge replacement. Two-span bridge with integral abutments on H-piles. New bridge will be widened to accommodate two lanes of traffic, two 5' shoulders, and one sidewalk. Approximately 200' of approach work to widen the approach shoulders and add a sidewalk is also included.

ALIGNMENT DESCRIPTION: The proposed horizontal alignment will match the existing Johnson Road alignment. From the western limits of work, the proposed profile starts at station 11+00.00 with a station 11+00.00 with a vertical tangent of 4.87%. At station 11+12.50 a 100 ft sag vertical curve will be utilized with an exiting grade of 8.00%. This grade continues to station 13+12.50 where a 150 ft crest vertical curve is implemented. The exiting grade of 3.50% continues from station 14+62.50 to the eastern limits of work, tying back into the existing profile at station 17+62.50.

APPROACH SECTION: Two 11' lanes, two 5'-0" shoulders, and one 6'-0" sidewalk to the south. The approach shoulders taper to match the existing 2'+/- shoulders. On the south side of the approaches, within the project limits, a sidewalk will be installed.

SPANS 121'-10" – 121'-10" **SKEW** 12° back on left

LOADING HL-93 Modified for Strength I **DESIGN SPEED** 35 mph

SUPERSTRUCTURE: Proposed superstructure will consist of a 9" reinforced concrete bare deck with integral wearing surface on five (5) welded steel plate girders. The superstructure will be 2-span continuous. The steel superstructure will be metalized. Four bar steel traffic barrier will be installed on the sidewalk and three bar steel traffic barrier installed on the brush curb. The out-to-out bridge width will be 41'-4". The new superstructure will provide a 16'-0" minimum vertical clearance over I-295.

ABUTMENTS: Cast-in-place reinforced concrete integral abutments with in-line wingwalls supported on H-piles. Maximum 2:1 slopes will be utilized for grading in front of and adjacent to the proposed abutments. The sloped area under the bridge will be treated with Crushed Stone Slope Protection. Abutments are skewed at 12 degrees back on left to align with the I-295 alignment below.

PIERS: Cast-in-place reinforced concrete wall pier. The ends of the wall pier will be constructed with a negative batter and each face will receive a recessed panel with formliner finish, similar to the geometry and finishes as detailed on the Lunt Road Bridge Replacement project (WIN21723). The wall pier will be supported by H-piles consisting of existing pier H-piles to be re-used and new H-Piles to be installed. The pier is skewed at 12 degrees back on left to align with the I-295 alignment.

AVAILABLE SOILS INFORMATION: Geotechnical investigation was not scoped as part of the preliminary design phase. Subsurface exploration and geotechnical evaluation will be performed during final design. The boring logs for the existing Johnson Road bridge, dated June 1957, can be found in the existing plans included as Appendix D.

ADDITIONAL DESIGN FEATURES: A sidewalk will be added to the south side of the new bridge. The bridge approaches will be widened to include a sidewalk within the project limits of construction.

MAINTENANCE OF TRAFFIC: The bridge will be closed for a maximum of 95 consecutive calendar days between March 2020 and August 2020. Traffic will be detoured to Bucknam Road with a formal signed detour route.

CONSTRUCTION SCHEDULE: One construction season including landscaping.

ADVERTISING DATE: August 2019

	Program Amount	Available Funding	Estimated Project Cost	Shortfall/ Surplus
Preliminary Engineering	\$260,000	\$260,000	\$300,000	-\$40,000
Right-of-Way	\$15,000	\$15,000	\$0	\$15,000
Construction [Structure	\$2,250,000	\$2,250,000	\$3,825,000	-\$1,575,000
Approaches			\$405,000	-\$405,000
Construction Engineering	\$250,000	\$250,000	\$300,000	-\$50,000
Total	\$2,775,000	\$2,775,000	\$4,830,000	-\$2,055,000

ADDITIONAL BORINGS REQUIRED? Yes

ADDITIONAL GEOTECHNICAL EVALUATIONS REQUIRED? Yes

APPROVED DESIGN EXCEPTIONS: N/A

COMMENTS BY ENGINEER OF DESIGN:

SUMMARY OF EXPECTED IMPACTS

RIGHT OF WAY

Number of: Property Owners 0
 Buildings to Be Taken 0

Type of Acquisitions: ☐ Fee Simple ☐ Easement
 ☐ Temporary Rights ☐ Temporary Road

UTILITIES: Two 3" diameter electrical conduit embedded in south curb. Overhead utilities along south fascia

COAST GUARD PERMIT NEEDED? No

FAA PERMIT NEEDED? No

ENVIRONMENTAL COORDINATION

Team Member: Kristen Chamberlain

NEPA/STIP	N/A- No Federal Funds
Section 106	N/A- No Federal Funds
Section 4(f)	N/A-No USDOT Funds
Federal Endangered Species	No Federal Nexus
State Endangered Species	Least bitterns in project area. Coordinated with IF&W; no further action required.
Essential Fish Habitat	No in-water work.
Fish Passage	N/A
In-Stream Window	N/A
Hazardous Material	No hazardous waste review required.
Dredge Material	N/A
Stormwater/MS4	N/A
DEP/LUPC	No jurisdiction
ACOE	No jurisdiction
Mitigation	N/A
Other	

Avoidance & Minimization: The proposed bridge and approach work are located within existing MaineDOT ROW.

SUMMARY OF PRELIMINARY DESIGN

1. BACKGROUND:

The Johnson Road Bridge (#5792) between Middle Road and Route 1 spans over NB and SB of Interstate 295 in Falmouth, Maine. The existing bridge consists of two separate structures: A 39.75' non-composite deck, simply supported bridge and a three-span, composite deck, continuous bridge (59'-59'-62') for a total span length of 219.75'. The bridge was built in 1957 and consists of steel stringers with a 7" thick deck with bituminous overlay. The abutments are composed of reinforced concrete founded on H-Piles, and all three piers are 3-column bents with concrete caps on H-piles. The original bridge cross section was 26' curb to curb, with 2'-6" concrete curb on both fascias. Both bridge railings consist of a 1' wide concrete parapet with extruded aluminum alloy railing, for a total out to out width of 33'-0".

Rehabilitative work was completed on the structure in 1991. This work included replacing the bituminous wearing surface and membrane waterproofing, cleaning and painting the existing structural steel and bearings, replacing the existing joint at Pier 1 with armored compression seals, modifying the existing expansion joint at the East Abutment, rehabilitating existing concrete as needed, connecting the existing approach guardrail to the existing concrete parapet, resetting the existing approach guardrail and rehabilitating the approach roadway at both ends of the bridge.

The bridge is scoped for rehabilitation/replacement in the Department's 2018-2020 Working Plan with a total budget of \$2.775 million for PE, ROW and Con/CE. During the process of preliminary design, alternatives considering deck replacement/superstructure widening and complete bridge replacement were explored.

2. EXISTING CONDITIONS:

Per the existing 2016 inspection report, provided by MaineDOT, the existing steel beams are in generally satisfactory condition (6) with prevalent light rusting. Isolated moderate to heavy rusting at the west pier girder ends and bearings is present. State records indicate the minimum clearance of the structure over I-295 is 14'-6" for the southbound lanes at the right shoulder.

The existing 2016 inspection report indicates the concrete deck is in fair condition (5) with minor cracking and light efflorescent staining and isolated delaminations and spalling. Collision damage to the west end bridge rail has broken off the transition piece and end post. The wearing surface has prevalent minor to moderate alligator cracking.

As indicated in the existing 2016 inspection report, the substructure is in poor condition (4). Abutments have scattered minor cracking. Piers are in good condition except for the west pier cap which shows moderate cracking and isolated areas of spalled and delaminated concrete and shear cracking at the north face bearing area. Although the inspection report indicates the piers are in generally good condition, recent testing of the pier columns at piers 2 and 3 show high chloride contents – indicative of deteriorated concrete and potential reinforcement corrosion (see 'Pier Column Concrete Testing' section for additional information). West pier

bearings are severely misaligned and in need of rehabilitation. The west pier bearings are currently blocked up with timber cribbing.

Pier Column Concrete Testing

In August 2018, MaineDOT sampled concrete cores from each of the three columns of the center median pier and east pier to test for chloride content. The west pier was not sampled as it is anticipated that this pier will be substantially rehabilitated or replaced with each design alternative to be evaluated. The field log, core locations and test reports can be viewed in Appendix K. Concrete cores were sampled at locations on the pier columns that are within the splash zone for de-icing salts from I-295. Extended exposure to deicing salts can result in a buildup of chloride within the concrete. Once chloride concentrations between 1.0 to 2.0 lb/CY¹ of concrete are reached adjacent to reinforcing steel, corrosion of the reinforcement is likely. According to the existing as-built plans, the pier columns have 2" of cover to the #4 ties.

Cores 1-3 were sampled along the southern side of the east pier columns. Each of these cores show high chloride levels from the surface to approximately 1.5" deep, ranging from 8.33 lb/CY to 12.22 lb/CY. At a minimum depth of 2" to a max depth of 5.25" (concrete surrounding existing reinforcement), the chloride content ranges from 1.21 lb/CY to 6.53 lb/CY. Core no. 4 was taken on the north side of the northernmost column of the east pier and exhibits lower chloride content (3.47 lb/CY 1.5" deep and 0.74 lb/CY 3" to 3.5" deep). The chloride content found in these concrete samples indicate that corrosion of the pier column reinforcing steel is likely. The columns exhibit minor cracking in the splash zone and the middle column shows evidence of previous concrete repair (patching).

¹Mindess, Sidney; Young, J. Francis & Darwin, David. (2002). *Concrete* (2nd ed). Prentice Hall.

3. UTILITIES

There are aerial wires approximately 5 feet off the south fascia that span over I-295. Aerial utilities onsite include:

- 3-phase power cables (owned by Central Maine Power Company)
- Communication Cables (owned by Consolidated Communications)
- Communication Cables (owned by Spectrum)

There is an existing underground waterline (owned by Portland Water District) approximately 60 feet south of the existing bridge's southern fascia. This waterline passes under I-295 NB and SB. Construction activities are not anticipated to impact the waterline.

The existing east abutment has an electrical conduit affixed to the north wingwall and to the front of the stub abutment. The conduit appears to originate/terminate at a stub utility pole just northeast of the existing wingwall and enters the ground on the south side (front face) of the east abutment.

The existing aerial facilities south of the bridge will likely require permanent relocation for design alternatives that consider structure widening/replacement to the south. Further utility coordination is required during final design to coordinate construction activities.

4. GEOMETRIC ALIGNMENT

To achieve a 16'-0" minimum vertical clearance over I-295, the proposed profile along Johnson Road shall be raised. The western limits of proposed work will tie into the existing profile at station 11+00.00 with a vertical tangent of 4.87%. At station 11+12.50 a 100 ft sag vertical curve will be utilized with an exiting grade of 8.00%. This grade continues to station 13+12.50 where a 150 ft crest vertical curve is implemented. The exiting grade of 3.50% continues from station 14+62.50 to the eastern limits of work, tying back into the existing profile at station 17+62.50.

The proposed horizontal alignment closely matches the existing Johnson Road horizontal alignment. The majority of the proposed bridge is located on a horizontal tangent. The west end of the bridge and west approach are located on a horizontal curve with a 4100 ft radius over the bridge. The proposed work does not require a realignment of Johnson Road, only a widening to account for the widened shoulder and addition of a sidewalk on the south side of the road.

5. EXISTING BRIDGE LOAD RATING

As part of preliminary design, an LRFR load rating for the existing bridge was developed. The bridge is comprised of two superstructures: the western-most span is a single span simply supported non-composite concrete deck on rolled steel beams and the remaining three spans are continuous with a partially composite concrete deck on rolled steel beams.

The governing HL-93 inventory rating for the single span was determined to be 1.01 for an interior girder with all legal load configurations rating greater than 1.0. The governing HL-93 inventory rating for the 3-span continuous portion of the bridge was determined to be 0.59 for an interior girder at pier 3 (negative moment). The typical interior girder rated less than 1.0 for all legal load configurations with the exception of Truck Configurations 7 & 8. The governing legal load rating factor was 0.83 for both Truck Configurations 3 & 6.

The controlling fatigue prone details on the structure are the Category E partial-length welded cover plates with tapered ends that are narrower than the flange. A Fatigue Limit State Rating Factor for infinite fatigue life was computed in accordance with the MaineDOT Load Rating Guide. A controlling fatigue rating factor of 0.33 at the termination of the Pier 3 cover plate located on the exterior girder line was calculated. The remaining fatigue life at this location was determined to be 138 years using a Resistance Factor for Evaluation of 1.2.

In reviewing the existing load rating, the governing rating location for both interior and exterior beams is for moment in the negative flexure region over the pier. Long unbraced lengths of the bottom flanges in these regions (bottom flange is the compression flange in negative flexure regions) govern the load carrying capacity with lateral torsional buckling being the controlling design criteria. Preliminary analysis of the existing stringers, considering proposed loadings, indicate that providing additional brace points along the bottom flange will help to reduce the unbraced length of the compression flange in these critical areas, resulting in increased load carrying capacity for the existing stringers. The addition of new braces to the bottom flange would not be a complex retrofit and would not be a significant additional cost to other rehabilitation efforts.

At a minimum, the design alternatives consider a deck replacement. The new deck will be made composite with the steel superstructure by installing shear connectors. Carrying the shear connectors through the negative flexure region of the continuous stringers would allow for negative moment steel in the deck to be considered in the load carrying capacity of the bridge. Carrying shear studs through the negative moment region of the stringers to provide composite behavior throughout the stringer would not be a complex retrofit and would not be a significant additional cost to the overall rehabilitation efforts.

The above retrofits would improve the load carrying capacity of the existing bridge, likely resulting in all legal load truck configurations rating greater than 1.0. However, even with considering the above retrofits, it is unlikely that the existing superstructure could be strengthened to produce a rating factor greater than 1.0 for the HL-93 truck. Johnson Road is classified as corridor priority (CP) 6. Based on the criteria for rehabilitated bridges provided in Engineering Instruction S1, a rehabilitated bridge with CP 6 may be posted. Considering additional bottom flange braces in the negative flexure areas and including a fully composite concrete deck, the existing superstructure could be strengthened to not require posting.

The existing structure Load Rating Report can be found in Appendix E.

6. TRAFFIC

The bridge carries Johnson Road over I-295 NB & SB with 2016 traffic volumes of 1440 AADT with 5% trucks. The AADT volumes on I-295 are 27,010 and 25,680 for northbound and southbound respectively. Additional traffic data is included in Appendix G.

Accident data was reviewed and there is not a significant amount of crashes in the project area. The accident data is included in Appendix G.

7. COMMUNITY OUTREACH

A preliminary public meeting with representatives and residents from the Town of Falmouth was conducted on July 11, 2018 to provide initial information about the proposed project and to elicit questions, comments, and concerns from the public to be considered when analyzing design alternatives.

In June 2017, the Town of Falmouth completed a *Route 1 North Vision Plan*. This plan envisions a new sidewalk on Johnson Road across I-295, calling for a sidewalk to be installed on the south side of Johnson Road from Route 1 to Middle Road. A copy of this document can be found in Appendix J. The Town also supports the inclusion of bicycle lanes on Johnson Road as there are few east-west connections across I-295. Bicycle lanes currently exist on Route 1 and there are newly installed bike lanes on Middle Road, from the new roundabout on Longwoods Road to the Cumberland town line.

With consideration given to MaineDOT's *Complete Streets Policy*, the rehabilitation of the Johnson Road bridge provides the opportunity to improve safety for motorists, bicyclists and pedestrians using the bridge. The bridge does not currently provide pedestrian access and the shoulders (2'-0" +/-) are too narrow to be safely used by bicyclists. The Town of Falmouth has demonstrated its commitment to increasing pedestrian and bicycle mobility throughout the town by playing an active role in recently completing and currently programmed transportation

improvement projects to ensure that bicycle and pedestrian accessibility is addressed whenever feasible. In July 2018, the Falmouth Town Council included in its FY 2018-19 Work Plan the task of taking the *Route 1 North Vision Plan* through the next step of Preliminary Engineering, demonstrating commitment from the Town to implement this Vision Plan. In accordance with the 'Project Relevance and Feasibility' section of the Complete Streets Policy and in consideration of efforts being made locally in the Town of Falmouth to provide better pedestrian and bicycle connectivity, improvements to pedestrian and bicycle facilities were added to the scope of this project to be evaluated as the alternatives for consideration.

8. PRELIMINARY GEOTECHNICAL EVALUATION & RECOMMENDATIONS

Preliminary design did not include new geotechnical investigations.

Per the existing bridge plans, the existing abutments and piers are supported on H-piles. A copy of the existing boring logs can be found in the existing plans in Appendix D.

Bridge widening/replacement alternatives will require additional geotechnical investigations as part of final design.

9. RIGHT OF WAY

Right-of-way lines provided by MaineDOT are shown on the General Plan included in Appendix A. Property acquisitions are not anticipated for the alternatives under consideration.

10. PROJECT SCHEDULE

The preliminary project schedule for the recommended alternative calls for project advertisement in August 2019. Construction would begin in spring 2020.

11. PURPOSE AND NEED

The primary goals for this project, at a minimum, are to address structural deficiencies throughout the existing bridge, address non-vehicular mobility over the bridge, and improve vertical clearance under the bridge over I-295.

The most recent bridge inspection report, conducted 4/21/2016, indicates the bridge deck is in fair condition with the superstructure in satisfactory condition. The substructure is shown to be in poor condition because of the extensive deterioration at the west pier cap. See section 2, *Existing Conditions*, for additional discussion pertaining to the bridge condition. The most recent LRFR bridge rating, completed October 2018, reveals rating factors of 0.59 for the HL-93 design truck and 0.83 for the governing MaineDOT Legal Load Configuration. See section 5, *Existing Bridge Load Rating*, for additional discussion pertaining to the structural deficiencies noted in the bridge rating.

The existing bridge does not provide pedestrian access across the structure and has substandard 1'-6" +/- shoulders. The existing under clearance over I-295 is 14'-6" with a required minimum equal to 16'-0" over the interstate.

12. SUMMARY OF DESIGN ALTERNATIVES

This project was initially scoped as a bridge rehabilitation considering a deck replacement and repair/replacement of the existing west pier. The preliminary design evaluates the following design alternatives:

1. Rehabilitation: Replace existing deck and west pier, with no widening.
2. Superstructure Replacement & Widening: Replace existing superstructure and replace existing west pier. Add pier extensions and widen superstructure to accommodate 5' shoulders and inclusion of a sidewalk.
3. Complete Bridge Replacement: Replace entire bridge with two-span integral steel girder bridge. New bridge will be widened to accommodate 5' shoulders and include a sidewalk.

Alternative 1: Bridge Rehabilitation – This alternative consists of replacing the existing 33'-0" deck with a composite 9" thick concrete deck with integral wearing surface. 3-Bar Traffic/Bicycle Railing would be provided, resulting in a bridge cross-section comprised of two 11'-0" travel lanes and two 3'-10" shoulders. These shoulders do not meet the 4'-0" minimum for spans greater than 200' as specified in the BDG, Section 4.1.2; however, as this alternative is considered a rehabilitation, the 3'-10" shoulders should be acceptable and offer an improvement over the existing 2'+/- shoulders.

After the existing deck is removed, additional braces will be installed in the negative moment regions of the 3-span continuous superstructure. Additional bottom flange braces in the negative moment regions will help to reduce the unbraced length of the beam compression flange and help to improve the load carrying capacity of the member. The addition of bottom flange bracing and making the deck fully composite with the steel beams will help to improve the overall load rating. With these improvements, it is anticipated that all legal load combinations will rate greater than 1.0 for both interior and exterior girders. The HL-93 rating factors will also improve; however, it is anticipated that the HL-93 vehicle will still rate less than 1.0.

After the existing deck is removed, the existing steel superstructure will need to be dismantled and temporarily stored. The existing steel beams will be re-used in the final condition; however, as pier 1 requires reconstruction and each substructure unit will require new beam seats to help increase the vertical clearance over I-295, dis-assembling and then re-erecting is recommended as opposed to jacking and shoring the steel beams in place. The existing piles at pier 1 will be re-used and supplemental piles added (as required by final design).

The concrete testing performed on the pier columns at piers 2 & 3 indicate high chloride content through the pier columns. As piers 2 & 3 will be re-used, removal of the deteriorated concrete and installation of concrete jackets are recommended for all remaining pier columns.

To improve joint leakage concerns at the abutments, this alternative considers the use of a slab over backwall detail to move the joint away from the abutment seats. The use of a link slab over pier 1 could be investigated during final design in an effort to eliminate a deck joint directly over the pier.

Considering a full closure of the Johnson Road bridge with conventional construction methods, it is estimated that the bridge closure period will need to be 60 consecutive calendar days. See Appendix L for the preliminary construction schedule.

This alternative addresses some of the structural deficiencies noted for the existing bridge by replacing the existing concrete deck with a new deck fully composite with the existing steel stringers by installing shear connectors along the full length of the bridge and by providing additional brace points in the negative moment regions. Both features help to improve the load carrying capacity, improving the load rating to have rating factors greater than 1.0 for all MaineDOT Legal Load combinations. The existing heavily deteriorated west pier is proposed to be replaced and the remaining two piers are proposed to be rehabilitated. The proposed re-decking also improves safety for vehicular and bicycle traffic over the bridge by providing 3'-10" shoulders and standard bridge rail. However, by not widening the bridge, the desired shoulder width of 5' and inclusion of a sidewalk is not attainable. Vertical clearance under the proposed rehabilitated structure is improved from 14'-6" to 16'-0" by reconstructing the existing beam seats to enable the existing steel beams to be set higher and by raising the profile over the bridge.

The overall construction cost estimate for Alternative 1, considering conventional construction methods utilizing a full closure of the Johnson Road bridge and detour on existing roads is approx. \$2.58 million (see Appendix M). Painting of the existing steel superstructure is not included in this cost estimate.

Alternative 2: Superstructure Replacement and Widening – This alternative consists of replacing the existing superstructure with a new, wider steel superstructure with a composite 9" thick concrete deck with integral wearing surface. The bridge cross-section will be comprised of two 11'-0" lanes, two 5'-0" shoulders, one 6'-0" sidewalk and 3-Bar and 4-Bar Traffic/Bicycle/Pedestrian railing for a total out-to-out width equal to 41'-4". To accommodate the wider superstructure, substructure extensions will be necessary. As the majority of the superstructure widening occurs to the south of the existing center of bridge, the substructure widening should occur on the south side. The new five girder cross-section will utilize metalized steel girders.

After the existing superstructure is removed, the west pier (pier 1) will be demolished and reconstructed. The reconstructed pier will be widened to the south to accommodate the new superstructure. Similar to Alternative 1, existing piers 2 and 3 will be rehabilitated by removing deteriorated concrete and installing concrete jackets. Unlike Alternative 1, this option does not require dis-assembling and re-erecting the existing steel superstructure.

The substructure widening will require additional H-Piles to be driven. The abutment stems at abutments 1 and 2 will be lengthened and new southern wingwalls constructed. Piers 2 and 3 will each require an additional column founded on an independent pile supported foundation.

The proposed superstructure will be four-span continuous, eliminating the existing joint over pier 1. To improve joint leakage concerns at the abutments, this alternative considers the use of a slab over backwall detail to move the joint away from the abutment seats. A complete superstructure replacement enables the design of a shallower superstructure depth, which helps to further improve the vertical clearance over I-295. A shallower superstructure

minimizes the change in profile and subsequent limits of roadway work to provide the 16'-0" vertical clearance. New steel beams will also improve the load-carrying capacity of the bridge.

Considering a full closure of the Johnson Road bridge with conventional construction methods, it is estimated that the bridge closure period will need to be 75 consecutive calendar days. See Appendix L for the preliminary construction schedule.

This alternative addresses the structural deficiencies noted for the existing bridge by replacing the existing superstructure with a new steel superstructure and fully composite concrete deck. The new steel superstructure is designed for the MaineDOT HL-93 Modified load which results in rating factors greater than 1.0 for the HL-93 truck and all MaineDOT Legal Load combinations. The existing heavily deteriorated west pier is proposed to be replaced and the remaining two piers are proposed to be rehabilitated. The proposed superstructure widening improves safety for vehicular, bicycle, and pedestrian users over the bridge by providing wider shoulders, a sidewalk, and standard bridge rail. The 5'-0" shoulders meet the criteria set forth by the Town of Falmouth to be used as bicycle lanes. The 6'-0" sidewalk provides access for pedestrians to cross the bridge when there was not previously a sidewalk. The 6'-0" sidewalk also meets the Town of Falmouth's request for a sidewalk on the bridge greater than 5'-0" wide to help facilitate snow removal based on the sidewalk clearing equipment the Town uses.

The overall construction cost estimate for Alternative 2, considering conventional construction methods utilizing a full closure of the Johnson Road bridge and detour on existing roads is approx. \$3.82 million (see Appendix M).

Alternative 3: Complete Bridge Replacement – This alternative consists of completely replacing the existing 4-span bridge with a new 2-span structure with a deck section width equal to 41'-4". The new bridge would provide one 6'-0" sidewalk to the south, two 5'-0" shoulders, and two 11'-0" travel lanes. The new superstructure would consist of 5 girders spaced at 9'-0" with a composite 9" thick concrete deck with integral wearing surface. The new steel girders are proposed to be metalized.

The proposed median pier will be a wall pier with similar geometry and aesthetics to the new Lunt Road bridge (currently being constructed). Due to the narrow median, the new wall pier will be constructed in the same approximate location as the existing 3-column bent. The new pier will be supported by H-piles consisting of existing pier H-piles to be re-used and new H-Piles to be installed.

The proposed two-span structure will utilize equal spans. As the existing bridge has unequal spans, the proposed east abutment piles will be installed between the front and back rows of the existing abutment piles. Equalizing the spans pushes the proposed west abutment piles behind the existing west abutment and wingwalls. Shortening the spans by installing the proposed east abutment in front of the existing east abutment was eliminated due to concerns about potential interference with existing battered piles.

Considering a full closure of the Johnson Road bridge with conventional construction methods, it is estimated that the bridge closure period will need to be 95 consecutive calendar days. See Appendix L for the preliminary construction schedule.

This alternative addresses the structural deficiencies noted for the existing bridge by completely replacing the existing structure with a new bridge. The new bridge will be designed

considering the HL-93 modified loading and will therefore rate for the HL-93 and all MaineDOT Legal Load combinations. The new bridge will be designed to provide a minimum 16'-0" vertical clearance over I-295 by raising the profile over the bridge. The new bridge improves safety for vehicular, bicycle, and pedestrian users over the bridge by providing wider shoulders, a sidewalk, and standard bridge rail. The 5'-0" shoulders meet the criteria set forth by the Town of Falmouth to be used as bicycle lanes. The 6'-0" sidewalk provides access for pedestrians to cross the bridge when there was not previously a sidewalk. The 6'-0" sidewalk also meets the Town of Falmouth's request for a sidewalk on the bridge greater than 5'-0" wide to help facilitate snow removal based on the sidewalk clearing equipment the Town uses.

The overall construction cost estimate for Alternative 3, considering conventional construction methods utilizing a full closure of the Johnson Road bridge and detour on existing roads is approx. \$4.23 million (see Appendix M).

13. EVALUATION OF DESIGN & CONSTRUCTION COMPONENTS

Town of Falmouth Input

The Town of Falmouth has multiple transportation improvement, large residential and commercial projects planned over the next several years, as well as the anticipated replacement of the Bucknam Road and Lunt Road bridges, which cross I-295 within 2 miles of Johnson Road, within the next three (3) years. A list of projects planned in and around the Town of Falmouth in the upcoming years can be found in Table 1.

Transportation Project	Scope	Status
Middle Road/Longwoods Road/Woods Road Intersection	Roundabout by MaineDOT	
Middle Road/ Falmouth Road/ Bucknam Road Intersection	Intersection Improvement by Town	
Lunt Road Bridge over I-295	Bridge Replacement by MaineDOT	Construction scheduled for 2019.
Bucknam Road Bridge over I-295	Bridge Replacement by MaineDOT	Construction scheduled for 2020.
Northbound I-295 exit/entrance/Bucknam Road	New traffic signal by MaineDOT	To be constructed concurrently with the Bucknam Road Bridge Replacement
Falmouth Turnpike Spur/Route 1	Spur Bridge and Ramp Redevelopment by Developer	Future
Middle Road		Conceptual Design Phase

Table 1: Transportation Projects in Falmouth, ME

With the large number of projects planned in and around Falmouth in the near future, minimizing the total duration of construction/traffic related impacts from the Johnson Road bridge project would be a valuable benefit for the local community.

Construction Costs Comparison

The bridge is scoped for rehabilitation in the Department's 2018-2020 Working Plan with a total budget of \$2.775 million for PE, ROW and Con/CE. Construction cost estimates were developed for each design alternative. A summary of estimated construction costs is provided below:

Construction Cost Estimates		
<i>Rehabilitation</i>	<i>Superstructure Replacement & Widening</i>	<i>Complete Bridge Replacement</i>
\$2.58 Million	\$3.82 Million	\$4.23 Million

Table 2: Design Alternatives Construction Cost Comparison

The preliminary cost estimates for each construction approach can be viewed in Appendix M. Construction costs were estimated considering the recent bid prices from WIN021723.00 Lunt Road Bridge Replacement. This project is representative for the work anticipated on the Johnson Road project as the bridge is located in Falmouth, requires work over I-295 and was recently awarded (Fall 2018).

Impacts to Johnson Road & Local Traffic

The bridge carries Johnson Road over I-295 NB & SB with 2016 traffic volumes of 1440 AADT with 5% trucks. The 2016 AADT volumes on I-295 are 27,010 and 25,680 for northbound and southbound respectively.

MaineDOT modeled anticipated traffic performance for various construction scenarios for the Johnson Road bridge reconstruction/replacement. The scenarios considered include:

1. Existing Conditions
2. Existing Conditions with anticipated improvements (programmed roundabout on Middle Road, new Lunt Road and Bucknam Road bridges, and signal at Bucknam Road/I-295 NB Ramps)
3. Johnson One-Lane: Alternating one-way traffic maintained on open lane by temporary traffic signal at the Johnson Road bridge over I-295.
4. Johnson Road bridge Closed: Johnson Road bridge would be completely closed with surrounding signalized intersections adjusted to accommodate changes in traffic flow.

The overall performance measures include vehicles denied entry (vehicles unable to enter the one-hour simulation due to congestion in the simulation model) and queue length (95th percentile for left turns and right turns, 50th percentile for thru movements). Intersection-level performance measures include volume/capacity ratio (by intersection movement) and total delay (extra travel time due to congestion, measured in vehicle hours).

As part of the traffic analysis, MaineDOT calculated user costs for each scenario. In addition to the user costs associated with delay, costs were also estimated for the additional distance traveled by detoured traffic. A summary of the estimated user costs is in Table 3.

Johnson Road User Impacts and Costs					
		Improved Falmouth Network		Johnson Rd Bridge One Lane	Johnson Rd Bridge Closed, Adjusted Traffic and Signals
PM Peak-Hour Travel					
	Vehicles Denied Entry	0		0	1
	Delay (VHT)	84		93	79
Delay Impacts					
	Peak-Hour Delay (VHT)	0		9	-5
	Daily Delay (VHT)	0		34	-19
	Daily User Costs			\$ 438	\$ (243)
Detour Impacts					
	Daily Distance (VMT)	0		0	1310
	Daily Travel Time (VHT)	0		0	37
	Daily User Costs			\$ -	\$ 851
Total	Daily User Costs			\$ 438	\$ 607
Interstate Closure User Impacts					
		via I-295	via US 1		
	Between Exits 10 and 15				
	speed	65	30	mph	Increase in
	distance	3.64	3.86	miles	travel cost
	travel time	0.056	0.129	hours	\$/vehicle
	travel cost	0.78	1.80	\$/vehicle	\$ 1.02

Table 3: Johnson Road Summary of User Costs

This analysis highlights that the 'Full Closure' (\$607 per day) and 'One Lane' (\$438 per day) scenarios have similar impacts to Johnson Road traffic. These relatively low user costs indicate that abbreviated full or partial closures of the Johnson Road bridge may be feasible.

As part of the traffic simulation, MaineDOT analyzed the impacts to local Town of Falmouth intersections considering the above construction scenarios. Intersection performance was evaluated considering level of service (LOS). The analysis includes overall performance measures of 'vehicles denied entry' into the model and 'total delay' in vehicle-hours. See Table 4 for a summary of the analysis. Due to relatively low traffic volumes on Johnson Road, the ability of local roads and intersections to temporarily handle additional traffic from Johnson during, and the small difference in user costs between a 'Full Closure' and 'One Lane' approach, a full bridge closure is recommended.

Falmouth - PM Peak Hour								
	Alternatives							
Intersections	Existing		Improved		Johnson One-Lane		Johnson Closed	
	LOS - delay	Q>Storage	LOS - delay	Q>Storage	LOS - delay	Q>Storage	LOS - delay	Q>Storage
Vehicles Denied Entry	194		0		0		1	
Total Delay	78		84		93		79	
Johnson-Middle	OK	OK	OK	OK	OK	OK	A-1.8	OK
One-Lane Johnson					C-30.7	OK		
Johnson-US1	OK	OK	OK	OK	OK	OK	A-7.2	OK
Long Woods-Middle	OK	OK	OK	OK	OK	OK	A-7.5	OK
Falmouth/Bucknam-Middle	C	EBT50 WBR95 SBL95	D-41.4	EBT50 WBR95 NBR95 SBL95	D-38.3	EBT50 WBR95 NBR95 SBL95	C-27.0	NBT95 NBR95
Bucknam-SB ramps	C	WBT50 SBT50	B-16.9	EBL95 WBT50 SBT50	B-16.1	EBL95 WBT50 SBT50	B-15.1	OK
Bucknam-NB ramps	C	SBT>>	B/C-19.5	OK	B/C-19.3	OK	C-23.2	EBL95 EBT95 WBT95
Bucknam-US1	B	EBL95	C-24.5	EBL95 NBL95 SBT50	C-21.6	EBL95 NBL95 SBT50	C/B-20.7	EBL95 EBT95 SBT95
Lunt-Falmouth	OK	OK	OK	OK	OK	OK	OK	OK
Lunt-Middle	OK	OK	OK	OK	OK	OK	OK	OK
Lunt-Depot	OK	OK	OK	OK	OK	OK	OK	OK
Depot-US1	C/B	OK	C-21.2	EBR95	C-21.2	EBR95	C-21.9	EBR95
Cleanwater-US1	A	OK	A-7.4	OK	A-7.9	OK	A-8.2	EBT95 NBT95 SBT95
Hunter-US1	A-2.3	OK	A-2.3	OK	A-3.0	OK	A-3.3	NBT95
Planned and Programmed Improvements								
Long Woods-Middle			in place		in place		in place	
Bucknam-NB ramps			in place		in place		in place	
Falmouth/Bucknam-Middle								
Bold queue indicates spillback to upstream intersection								
LOS - delay based on overall intersection delay and signalized LOS scale								
Temporary treatments					install temporary signal			

Table 4: LOS Summary for Surrounding Intersections

The 'Full Closure' scenario does not show significant deterioration in LOS compared to the 'Existing – Improved' or 'One Lane' scenarios. The lowest LOS for the 'Full Closure' scenario is a 'C' with comparable 'Vehicles Denied Entry' and 'Total Delay' to both the 'Existing – Improved' and 'One Lane' construction approaches.

Due to relatively low traffic volumes on Johnson Road and the ability of local roads and intersections to temporarily handle additional traffic from Johnson during a full bridge closure, an on-site temporary bridge is not recommended. A temporary bridge with the necessary temporary approach work would add substantial construction costs to the project (estimated at approximately \$1 million). In addition, temporary ROW acquisitions would likely be necessary in order to construct the approach embankments along the eastern approach to the bridge.

Impacts to I-295

The Johnson Road bridge spans over both northbound and southbound of Interstate 295. The ability to minimize construction and traffic related impacts to I-295 to the extent practical is a critical component when considering possible construction approaches.

With consideration given to the high traffic volumes experienced during the daytime hours on I-295, the Contractor will not be permitted to utilize single lane closures and/or full closures on I-295 during the day between 6:00 AM and 10:00 PM. The Contractor will be allowed a limited number of full closures on I-295 for the work activities specified below with the following restrictions.

- Single lane closures on I-295: 10:00 PM to 5:00 AM (Sunday Night thru Thursday Night)
- Full closures on I-295: 1:00 AM to 5:00 AM (Monday AM thru Friday AM)

MaineDOT's evaluation of hourly traffic volumes on I-295 indicated that full closures could begin earlier (12:00 AM) and single lane closures could start earlier and end later (9:00 PM to 7:00 AM NB and 8:00 PM to 6:00 AM SB); however, it is recommended that the more restrictive work windows listed above be utilized. During a full closure on I-295, traffic would be detoured off I-295 to Route 1 to avoid the project site. Due to the early morning time restrictions for full closure, MaineDOT's analysis indicates an approximate \$1 per vehicle user cost for the detour. See Table 5 for a summary of anticipated full closures required on I-295. As temporary nighttime single lane closures on I-295 do not significantly impact the traveling public (as at least one lane of traffic is maintained in each direction and traffic volumes on I-295 are low during the times allowed), a set number of single lane closures has not been developed.

	Rehabilitation - Deck Replacement	Superstructure Replacement & Widening	Complete Bridge Replacement
Total Number of temp. 'Full Closures on I-295'	14	16	16
<i>Existing Structure Demolition</i>	8	8	8
<i>Steel Erection</i>	0	8	8
<i>Dis-Assemble /Re-Erect Existing Steel Superstructure</i>	6	0	0

Table 5: Summary of Full Closures on I-295

Construction Duration

As indicated by the user cost calculations comparing a phased construction with alternating one-way traffic (\$438/day) and a single phase approach with a full bridge closure and detour on existing roads (\$607/day), the impacts to the traveling public are relatively small for either construction approach. The major advantage of a single phase full closure construction approach is realized by reducing the overall construction duration (construction exposure) and minimizing the impacts to I-295. For each activity that requires nighttime single lane or full closures on I-295, the total number of occurrences would be doubled for a phased construction approach compared to a single phase full closure. As such, single phase construction with a full bridge closure and detour on existing roads is the preferred construction approach. Preliminary Construction Schedules were developed for each design alternative considering single phase construction with full closure (see Appendix L).

A summary of construction durations requiring full bridge closure is summarized below for each design alternative:

Johnson Road Closure (Calendar Days)		
<i>Rehabilitation – Deck Replacement</i>	<i>Superstructure Replacement & Widening</i>	<i>Complete Bridge Replacement</i>
60 CD	75 CD	100 CD

Table 6: Summary of Construction Durations

All construction approaches consider a 6-day work week. The anticipated durations consider the work window restrictions for activities that may require single lane or full closures on I-295.

All construction cost estimates and construction schedules were developed considering conventional construction techniques. Due to the limited anticipated bridge closure period and the low user costs associated with a full bridge closure, accelerated bridge construction (ABC) techniques are not anticipated to provide significant value to the project. The use of precast substructure elements could decrease the overall bridge closure period; however, the additional construction costs associated with precast elements is unlikely to be offset by a reduction in user costs. Use of large precast elements may also impact the total number of night closures required on I-295. All pier work is proposed to be CIP, not requiring night closures (other than to initially setup median work zones). If precast pier elements were utilized, larger equipment (i.e. cranes) would likely be needed to setup on the interstate to erect these members – requiring additional night closures on I-295. As such, ABC techniques were not included in development of the preliminary construction cost estimates or preliminary construction schedules.

Evaluation Matrix

An evaluation matrix was developed to show a summary of the evaluation criteria for the Johnson Road bridge construction approach. See Table 7.

Evaluation Matrix - Johnson Road Bridge over Interstate 295, Falmouth, ME				
DESIGN ALTERNATIVES		1	2	3
		Rehabilitation - Deck Replacement	Superstructure Replacement & Widening	Complete Bridge Replacement
CONSTRUCTION COST	Superstructure	\$628,000.00	\$1,325,000.00	\$1,864,000.00
	Abutments	\$174,000.00	\$440,000.00	\$470,000.00
	Pier	\$336,000.00	\$513,000.00	\$395,000.00
	Structural Excavation & Borrow	\$18,000.00	\$65,000.00	\$77,000.00
	Existing Bridge Removal	\$260,000.00	\$320,000.00	\$400,000.00
	Substructure Rehabilitation & Superstructure Dis-assembly	\$380,000.00	\$200,000.00	\$0.00
	Approaches	\$298,000.00	\$338,000.00	\$338,000.00
	Miscellaneous	\$273,000.00	\$289,000.00	\$324,000.00
	Mobilization	\$210,000.00	\$321,000.00	\$359,000.00
	Total Cost	\$2,580,000.00	\$3,820,000.00	\$4,230,000.00
TRAFFIC IMPACTS & USER COSTS	Anticipated worst-case impact to intersection LOS	C	C	C
	User Cost associated with delays from 'Full Closure of Johnson Road Bridge'	\$607.00 per day		
	User Cost associated with delays from 'One-Way Thru Traffic on Johnson Road Bridge'	\$438.00 per day		
	User Cost associated with delays from detour for 'Full Closures on I-295' (NB + SB between 1:00 AM & 5:00 AM)	\$1,161.00 per 4 hr full closure		
	Total User Cost from 'Full Closure of Johnson Road Bridge'	\$36,420.00	\$45,525.00	\$60,700.00
	Total User Cost from 'Full Barrel Closures on I-295'	\$16,254.00	\$18,576.00	\$18,576.00
	TOTAL USER COSTS DURING PARTIAL/FULL CLOSURE	\$52,674.00	\$64,101.00	\$79,276.00
CLOSURE DURATION	Overall Construction Duration	1 Const. Seasons	1 Const. Seasons	1 Const. Season
	Number of Days requiring full closure of Johnson Road bridge	60	75	100
	Total Number of temp. 'Full Closures on I-295'	14	16	16
	Existing Structure Demolition	8	8	8
	Steel Erection	0	8	8
	Dis-Assemble /Re-Erect Existing Steel Superstructure	6	0	0

Table 7: Evaluation Matrix

14. CONCLUSIONS & RECOMMENDATIONS

As discussed in Section 13 – Evaluation of Design & Construction Components – Impacts to Johnson Road & Local Traffic, a full closure of the Johnson Road bridge with detour using local roads is anticipated to have minimal adverse impacts to the traveling public compared to a staged construction approach utilizing alternating one-way traffic. A full closure with local detour is preferable compared to staged construction due to a reduced total construction duration and fewer anticipated nighttime closures on I-295. An onsite detour via temporary bridge is not recommended due to high costs and limited ROW. As a result, each design alternative was evaluated considering a full closure of the Johnson Road bridge with a detour on local roads.

Alternative 1 does not satisfy all parts of project's Purpose & Need statement. The proposed improvements are not anticipated to enable the bridge to rate greater than 1.0 for the HL-93 truck and the desired wider shoulders and sidewalk are not attainable. In addition, Alternative 1 will require the existing steel superstructure to be dis-assembled and re-erected to increase the vertical clearance over I-295 and to allow existing Pier 1 to be reconstructed. Although Alternative 1 has the lowest anticipated construction cost, the construction cost estimate does not include the costs associated with future painting of the existing steel superstructure. The proposed improvements identified in Alternative 1 do not fully satisfy the main objectives of the project. Alternative 1 is not recommended to be advanced to final design.

Alternatives 2 and 3 each satisfy all parts of the project's Purpose & Need statement. Alternative 2 is estimated to have a lower construction cost. Both alternatives are anticipated to have similar impacts to local & I-295 traffic and will require similar overall construction durations. Alternative 2 requires substantial rehabilitation of the existing piers 2 and 3 to remain and complete reconstruction of pier 1. Considering the potential for future growth, the existing 4-span configuration, re-used in Alternative 2, is restrictive for potential widening of I-295. Alternative 3 utilizes a two-span structure, eliminating the existing piers 1 and 3 located in the shoulders. Alternative 3 would enable the widening of I-295 in both directions.

Alternative 3 is estimated to cost approximately \$410k more than Alternative 2. The relatively small cost difference between a completely new bridge and a widened/rehabilitated existing bridge comes down to the following key work items:

- Alternative 2 estimates approx. \$200k in rehabilitation costs to the existing piers/abutments to remain.
- Alternative 2 requires more equipment mobilizations as five separate substructure units require new piles to be installed (Alt. 3 requires three locations).

It is recommended that the existing Johnson Road bridge be replaced in its entirety with a new two-span structure to be constructed in a single phase, utilizing a full bridge closure with detour on local roads.

The following design features are recommended for final design:

- The existing bridge (33'-0" out-to-out) shall be replaced in its entirety by a two-span fully integral bridge (41'-4" out-to-out).
- All concrete shall be cast-in-place.
- All structural steel shall be metalized.
- 9" CIP concrete composite deck (8" structural, 1" integral wearing surface).
- Reinforcing steel shall be stainless steel throughout the deck, approach slab, abutments, and pier.
- The existing Johnson Road profile shall be adjusted to increase vertical clearance over I-295 to achieve a minimum 16'-0" under clearance.
- Traffic on Johnson Road shall be detoured on local roads during the full closure of the bridge.

The bridge replacement, using conventional construction techniques with a full bridge closure and local detour is estimated at \$3.825 million and the approach modification cost is \$0.405 million. The resulting total construction cost is approximately \$4.23 million. The total project

cost, including PE, ROW, Construction and CE is \$4.83 million. The preliminary construction cost estimate for the recommended alternative is included in Appendix M.

The proposed project schedule targets advertisement for construction in August 2019.

Appendix A

Preliminary Plans

SPECIFICATIONS

Design: Load and Resistance Factor Design per AASHTO LRFD Bridge Design Specifications, Eighth Edition, 2017.

DESIGN LOADING

Live Load HL - 93 Modified for Strength I

TRAFFIC DATA

Current (2016) AADT	1,440
Future (2036) AADT	1,730
DHV - % of AADT	11%
Design Hour Volume	190
% Heavy Trucks (AADT)	5%
% Heavy Trucks (DHV)	3%
Directional Distribution (DHV)	50%
18 kip Equivalent P 2.0	27
18 kip Equivalent P 2.5	25
Design Speed (mph)	35

MATERIALS

Concrete:	
Curbs and Transition Barriers	Class "LP"
All Other	Class "A"
Reinforcing Steel	
Stainless Steel	ASTM A955/A955M, Grade 75
Structural Steel:	
All Material (except as noted) . . .	ASTM A709, Grade 50 (Metalized)
High Strength Bolts	ASTM F3125, Grade A325 Type 1 (Galvanized)

BASIC DESIGN STRESSES

Concrete:	
Class "LP"	f'c = 5,000 psi
Class "A"	f'c = 4,000 psi
Reinforcing Steel:	
Stainless	f y = 75,000 psi
Structural Steel:	
ASTM A709, Grade 50	F y = 50,000 psi
ASTM F3125, Grade A325, Type 1	F u = 120,000 psi



FALMOUTH
CUMBERLAND COUNTY
JOHNSON ROAD BRIDGE
OVER
INTERSTATE 295
PROJECT NO. 021721.00
PROJECT LENGTH 0.14 mi
BRIDGE NO. 5792

UTILITIES

Consolidated Communications
Central Maine Power Company
Spectrum

MAINTENANCE OF TRAFFIC

Bridge closed during construction. Traffic detoured on local roads.

<u>PROJECT LOCATION:</u>	On Johnson Road Over Interstate 295 Latitude 43°44'32" N Longitude 70°13'27" W
<u>PROGRAM AREA:</u>	Bridge Program
<u>OUTLINE OF WORK:</u>	Bridge Replacement

INDEX OF SHEETS

<u>Description</u>	<u>Sheet No.</u>
Title Sheet	1
Preliminary Plan	2
Profile	3
Typical Sections (1 of 2)	4
Typical Sections (2 of 2)	5

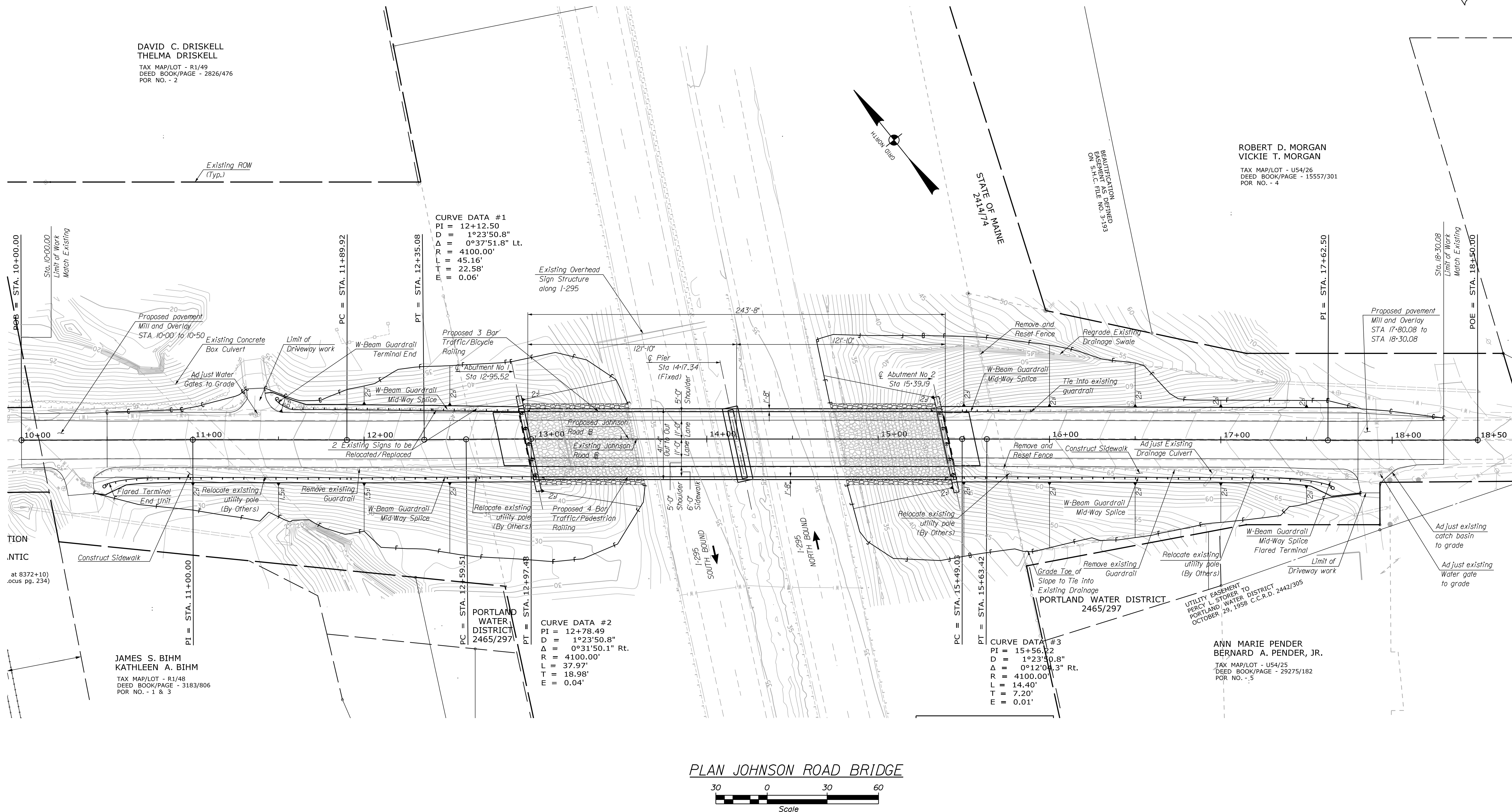
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		PROJECT MANAGER	JOEL KITTRIDGE	SIGNATURE			
		DESIGNER	ADAM STOCKIN, P.E.	P.E. NUMBER			
		CONSULTANT	WSP USA	DATE			
TITLE SHEET		PROJECT RESIDENT		COMMISSIONER:			
		CONTRACTOR		CHIEF ENGINEER:			
		PROJECT COMPLETION DATE					

DAVID C. DRISKELL
THELMA DRISKELL
TAX MAP/LOT - R1/49
DEED BOOK/PAGE - 2826/476
POR NO. - 2

ROBERT D. MORGAN
VICKIE T. MORGAN

TAX MAP/LOT - U54/26
DEED BOOK/PAGE - 15557/301
POR NO. - 4

BRIDGE No 5792	WIN	021721.00
BRIDGE PLANS		



JOHNSON ROAD BRIDGE
 INTERSTATE 295
 FALMOUTH CUMBERLAND
 PRELIMINARY PLAN

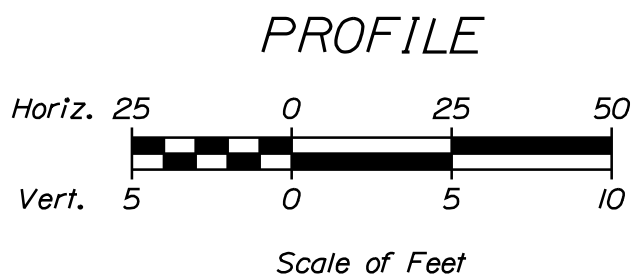
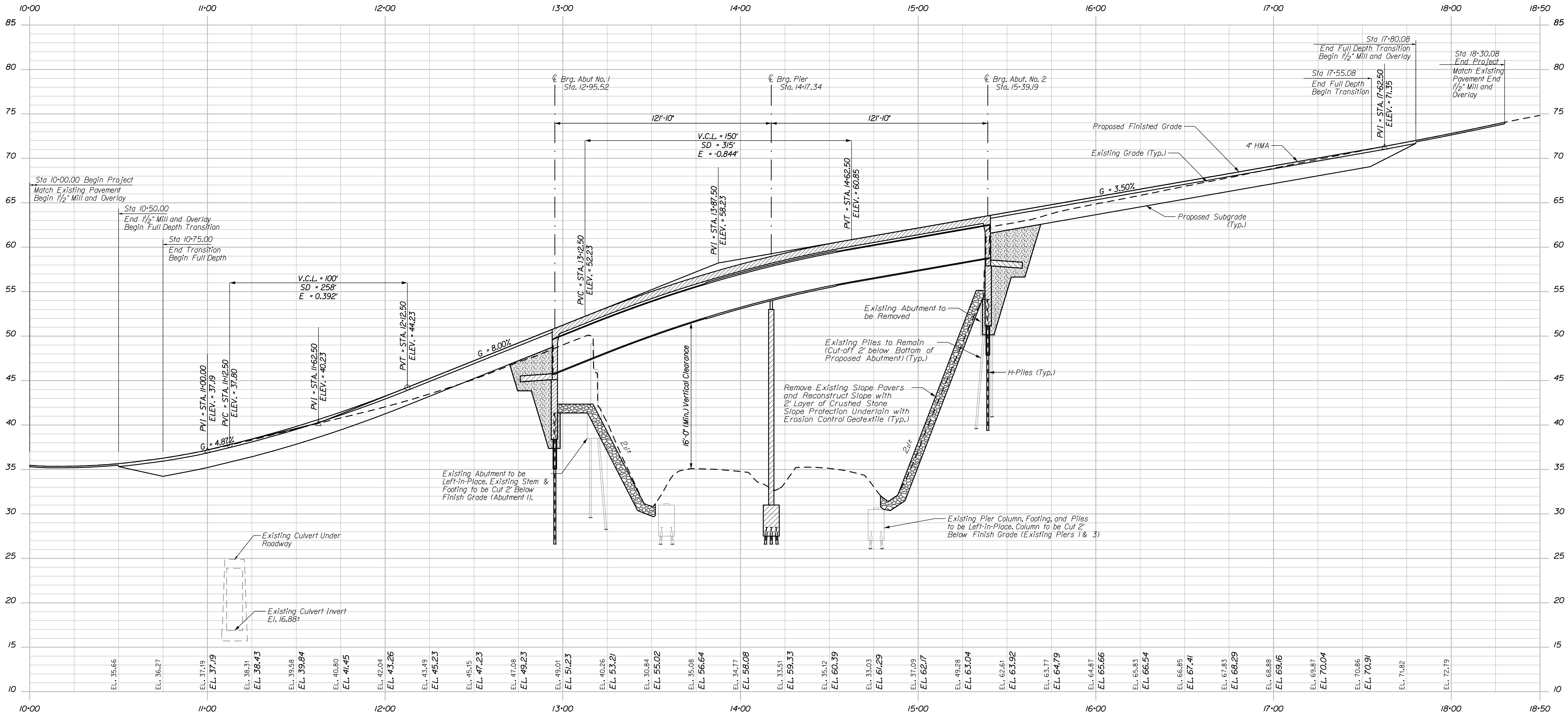
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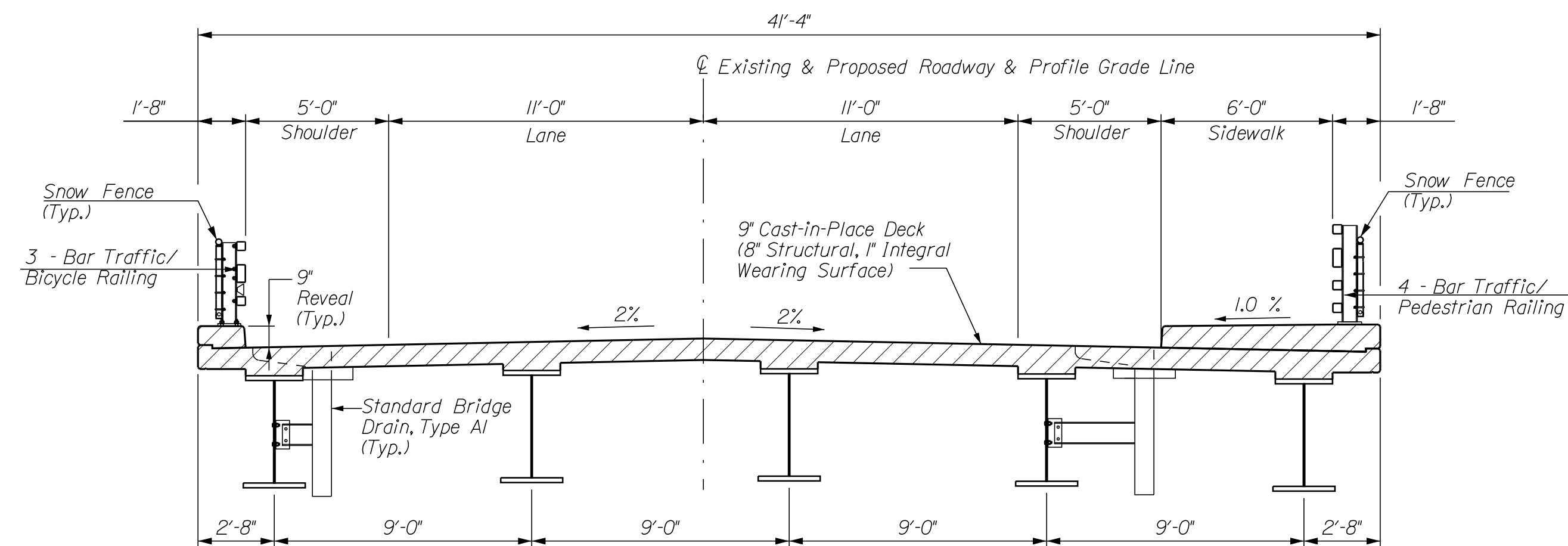
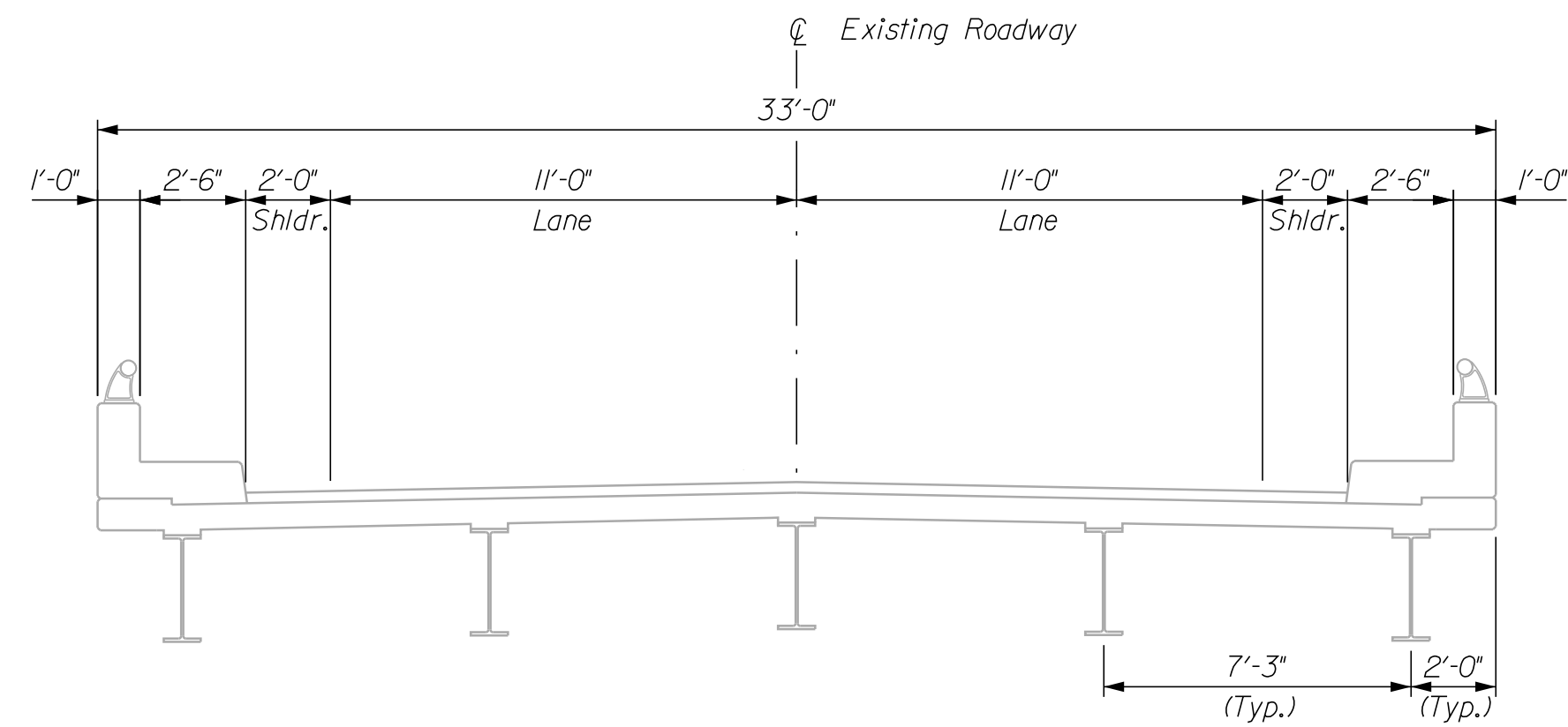
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CHECKED-REVIEWED	RAB	RAB	12/18
DESIGN-DETAILED			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

JOHNSON ROAD BRIDGE INTERSTATE 295 FALMOUTH CUMBERLAND	SIGNATURE
PROFILE	P.E. NUMBER
	DATE

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Appendix B

Photographs



Photo 1: Bridge Elevation Looking South



Photo 2: Topside Looking East

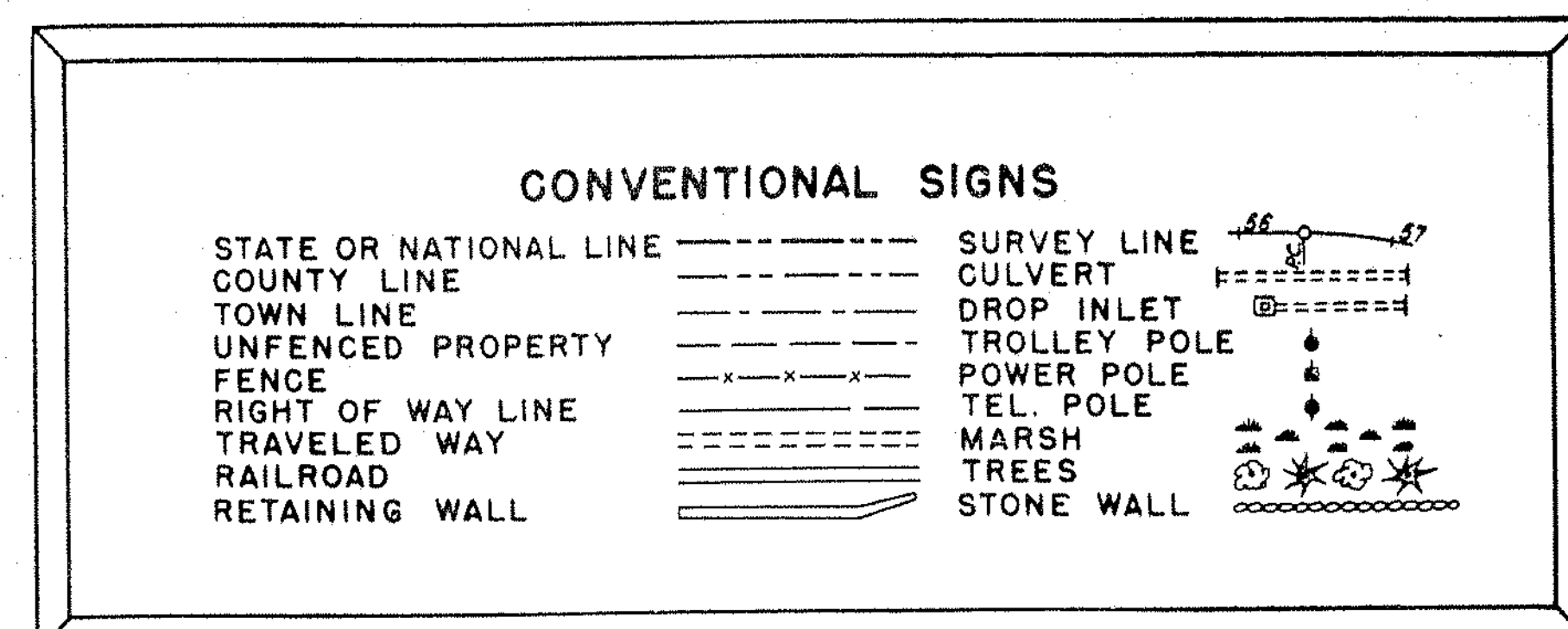
Appendix D

Existing Bridge Plans

STATE OF MAINE STATE HIGHWAY COMMISSION

PLAN AND PROFILE STATE HIGHWAY 95 FALMOUTH CUMBERLAND COUNTY

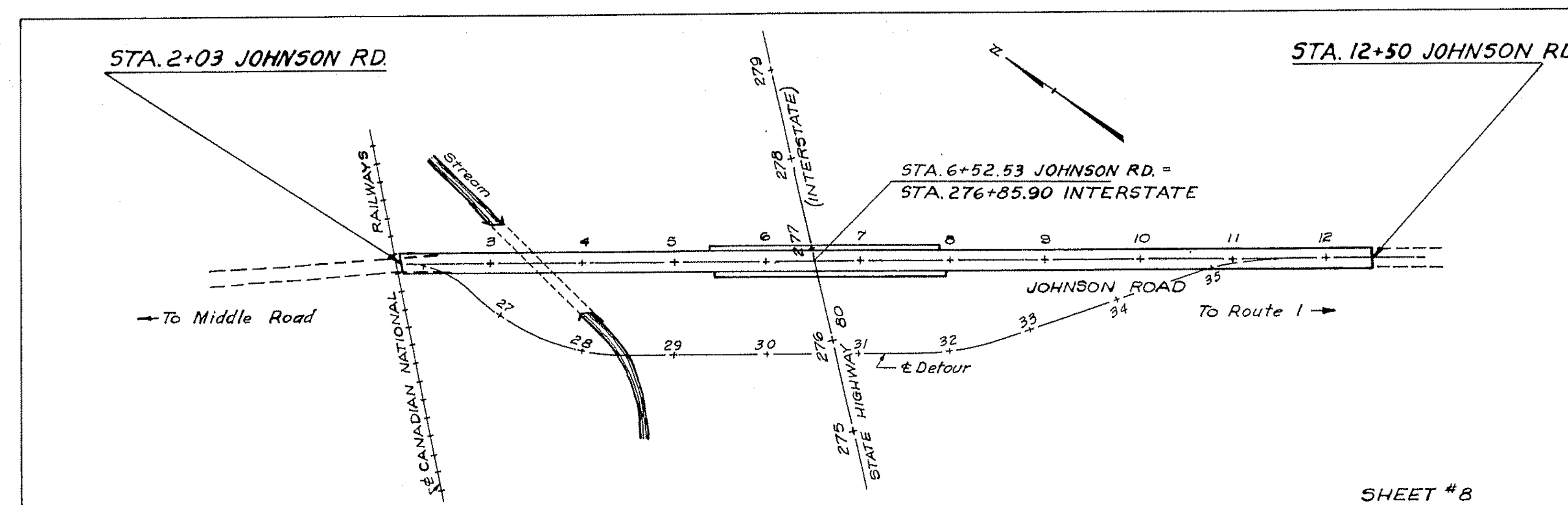
FEDERAL AID PROJECT NO. I- 95 -4(5)



INDEX OF SHEETS	
SHEET NO. 1	TITLE PAGE
SHEET NO. 2	TYPICAL SECTIONS
SHEET NO. 3	QUANTITIES
SHEET NO. 4-6	STANDARD DETAILS
SHEET NO. 8-9	PLAN AND PROFILE STA. 2+03 TO 12+50
SHEET NO. 10-17	CROSS SECTIONS
SHEET NO. 18-24	BRIDGE
SHEET NO. 7	SPECIAL DETAILS - BOX CULVERT
SHEET NO. 8A	UTILITIES

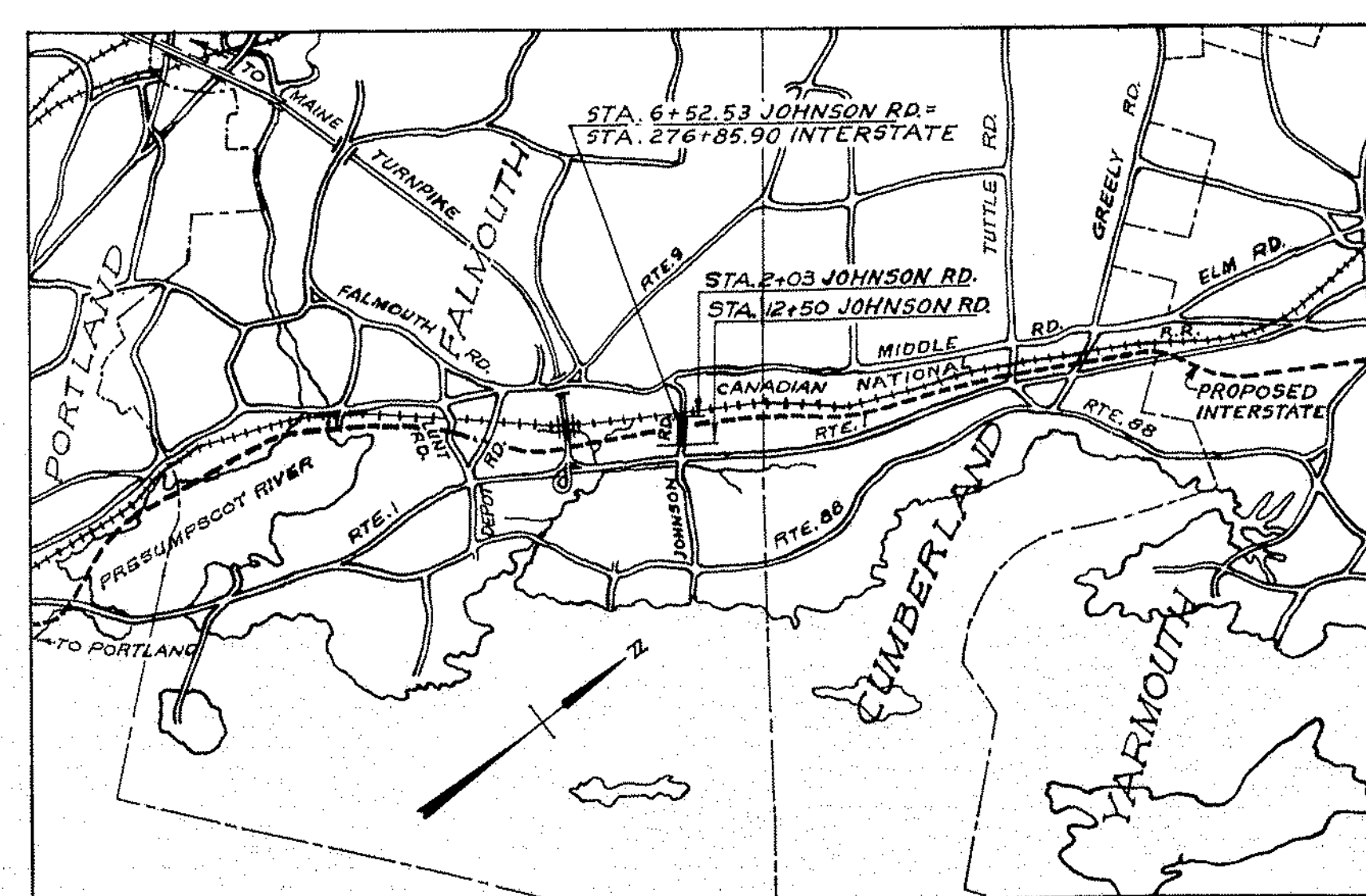
JOHNSON ROAD BRIDGE

PLAN 1 IN. = 50 FT.
 PROFILE HOR. 1 IN. = 50 FT.
 VER. 1 IN. = 5 FT.
 CROSS HOR. 1 IN. = 10 FT.
 SECTIONS VER. 1 IN. = 10 FT.



All work contemplated under this contract to be governed by and in conformity with the Standard Specifications for Highways and Bridges adopted January 1956, except as modified on the plans and in the special provisions.

Datum: Mean Sea Level
 Boring Data shown on these plans represent only the findings of the site of borings and are not in themselves representations of actual sub-surface conditions. The contractor is to form his own opinion and make his own interpretation of the borings. The engineer does not warrant the finding to be accurate or complete.



A PORTION OF CUMBERLAND COUNTY
 Approximate Scale: 1 Inch = 1 Mile

LAYOUT PLAN
 Scale: 1 Inch = 100 Ft.

AS BUILT 1959

A.D.T. (1955) = 300
 A.D.T. (1975) = 420
 D.H.V. (1975) = 42
 D (1975) = 55%
 T (1975) = 11%
 V = 40 M.P.H.

PREPARED BY
FAY, SPOFFORD & THORNDIKE, INC.
 ENGINEERS BOSTON-PORTLAND

APPROVED:
 MAINE STATE HIGHWAY COMMISSION

David H. Thorne
 CHAIRMAN

Harold B. Emery

Charles H. Jones
 CHIEF ENGINEER

DEPARTMENT OF COMMERCE
 BUREAU OF PUBLIC ROADS
 REGION I

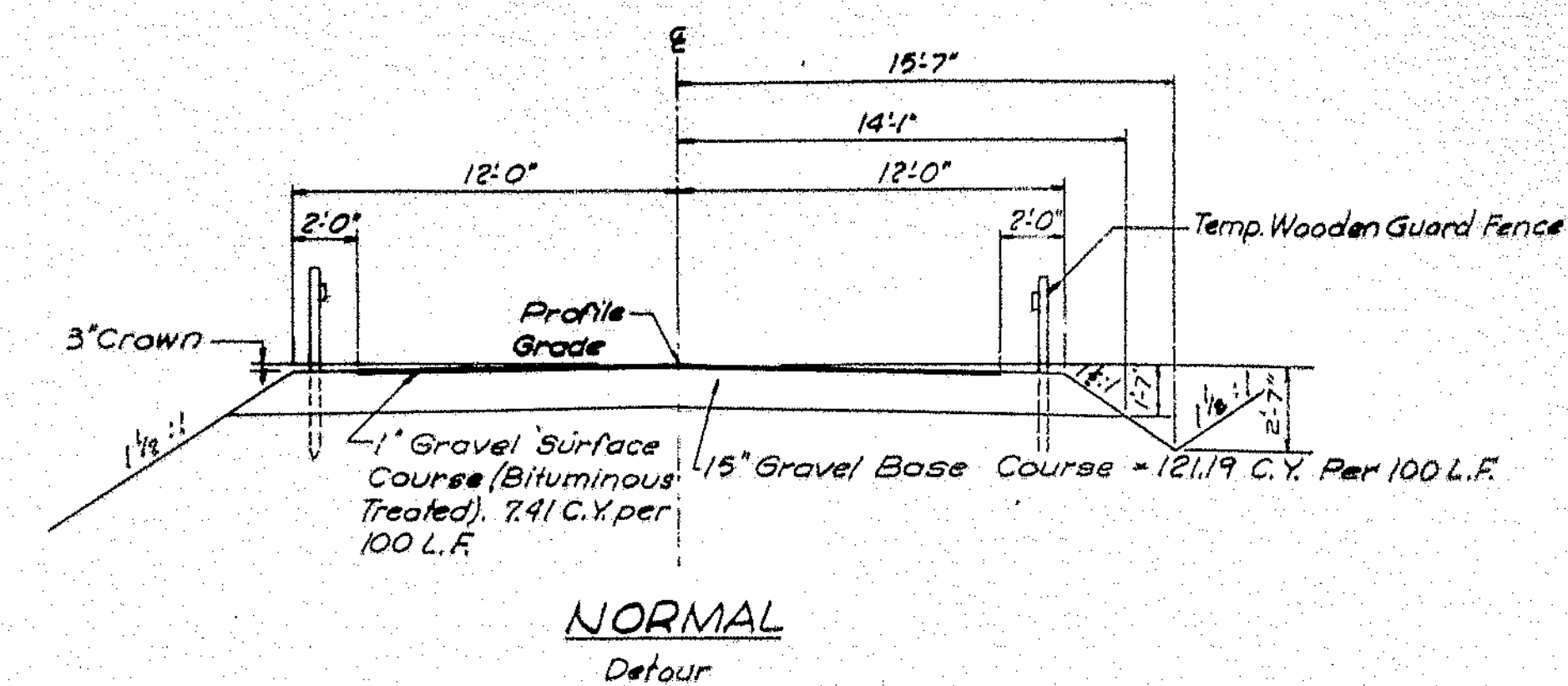
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DIVISION ENGINEER DATE

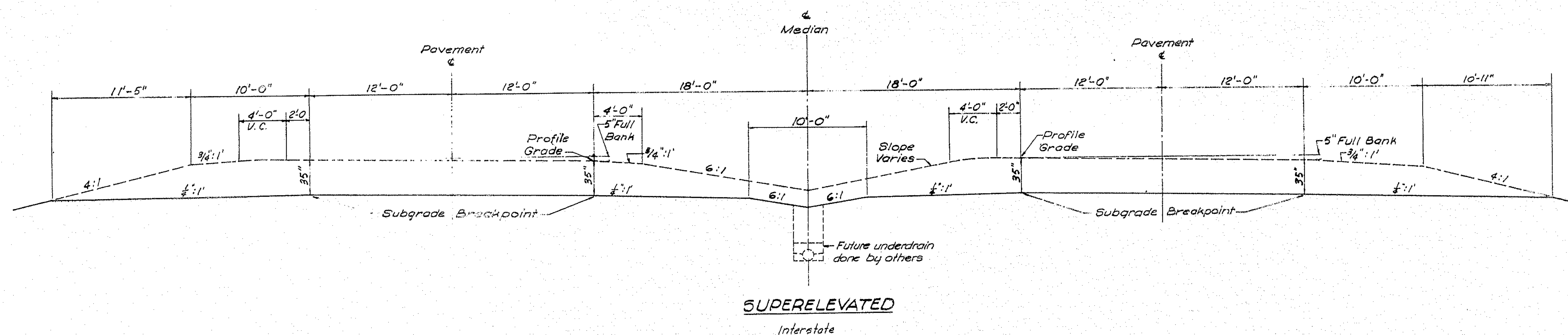
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 DES M.R.L.
 DR M.R.L.
 TR M.R.L.
 CHK L.R.G.
 APPD H.J.V.

1" GRAVEL SURFACE COURSE

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON-PORTLAND
FALMOUTH



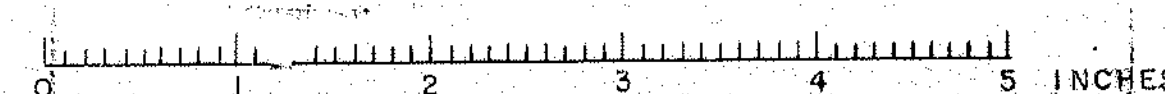
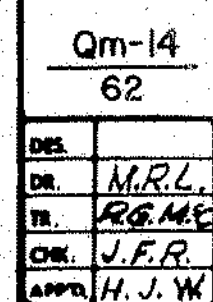
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SUPERELEVATED
Interstate

STATE HIGHWAY COMMISSION AUGUSTA, MAINE		
PORTLAND-YARMOUTH INTERSTATE		
TYPICAL CROSS SECTIONS		
SHEET NO. 2 OF 24	SCALE:	HOR. 1"=5' VERT. 1"=5'

75-181



PRELIMINARY			
CLEARING - Dimensions from E			
STATION	DIST LEFT	DIST RIGHT	
2+55	0		
2+50	50'-57'		
2+75	25'-56'		
3+20	25'-75'		
3+50	25'-96'		
3+70	28'-124'		
4+00	30'-150'		
4+50	30'-150'		
5+00	30'-150'		
5+50	30'-150'		
6+00	20'-145'		
6+50	20'-160'		
7+00	20'-79'		
7+50	25'-79'		
8+00	25'-79'		
8+50	20'-56'		
9+00	20'-46'		
9+50	18'-45'		
10+00	18'-55'		
10+50	18'-56'		

PRELIMINARY			
TREES REMOVED			
STATION	SIDE	DESCRIPTION	
10+59	9' TO 28' LT.	18" Pine	
11+31	Over 24' LT.	36" Oak	

FINAL			
RIGHT OF WAY MONUMENTS			
STATION	LEFT	RIGHT	NO.
2+50	150'		1
2+57		61'	1
4+87	150'		1
5+18		86'	1
7+88	85'	74'	1
8+22	50'	50'	2
9+50	50'		1
11+0			

FINAL			
GRANITE CURB TYPE I			
STA. TO STA.	SIDE	LENGTH	KIND
5+17.27 TO 5+33.27	LT.	16'	Straight
5+24.29 TO 5+40.29	RT.	16'	"
7+87.02 TO 8+03.02	LT.	16'	"
7+94.04 TO 8+10.04	RT.	16'	"

PRELIMINARY			
TEMP. GUARD RAIL TYPE "A"			
STA. TO STA.	SIDE	LENGTH	REMARKS
26+60 - 29+08	LT.	240'	2 Detour
26+80 - 29+00	RT.	220'	2 Detour

PRELIMINARY			
TEMP. WOODEN GUARD FENCE			
STA. TO STA.	SIDE	LENGTH	REMARKS
29+04 - 32+48	LT.	544'	Detour
29+08 - 34+16	RT.	512'	Detour

FINAL			
GUARD RAIL - TYPE "E"			
STA. TO STA.	SIDE	LENGTH	END WINGS
2+22 TO 2+47	RT.	37.5'	2
2+90 TO 5+40	RT.	262.5'	2
7+95 TO 9+95	RT.	200.0'	2
2+15 TO 3+53	LT.	150.0'	2
3+95 TO 5+32	LT.	150.0'	2
7+89 TO 9+76	LT.	187.5'	2

PRELIMINARY			
GRAVEL BASE			
STA. TO STA.	DESCRIPTION		
2+05 TO 12+50	6" Crushed Gravel, 18" Gravel		
DETOUR 25+76 TO 35+64.90	15" Gravel		

FINAL			
DRIVEWAYS			
STATION	SIDE	REMARKS	
2+67	RT.	1" Gravel Surface - 15" Gravel Base	
3+72	LT.	1" Gravel Surface - 15" Gravel Base	
10+22	RT.	2" Bit. Conc. Type "A" - 15" Gravel Base	
10+74	LT.	1" Gravel Surface - 15" Gravel Base	
12+55	LT.	1" Gravel Surface - 15" Gravel Base	

PRELIMINARY			
LOAM, SEED, HAY MULCH			
STA. TO STA.	SIDE	REMARKS	
2+07 TO 5+38	LT.	Johnson Rd. & Counter Weight	
2+14 TO 5+45	RT.		
2+23 TO 4+19	RT.	Lawn Replacement After Detour Removal	
7+83 TO 12+50	LT. & RT.	Full Section to Bridge Paving	
9+77 TO 10+16	LT.	Johnson Rd.	
9+77 TO 10+90	RT.	Lawn Replacement After Detour Removal	
7+65 TO 10+50	Detour		
5 Driveways	Detour	See Driveway	

PRELIMINARY			
SODDING			
STA. TO STA.	SIDE	REMARKS	
2+23 TO 2+50	RT.	Sod Ditch	
3+50 TO 3+95	RT.	Sod Ditch	
5+12	LT.	Sodded Gutter Outlet	
5+17	RT.	"	
6+50 TO 9+60	LT.	Sod Ditch	
9+55 TO 10+14	RT.	"	
10+10 TO 10+70	LT.	Rebuild Existing Lawn	
10+28 TO 12+25	LT.	"	
11+70 TO 12+50	RT.	"	

FINAL			
DRIVEWAY CULVERTS			
STATION	SIDE	SIZE	REMARKS
2+40 TO 3+91	RT.	30" x 148"	CMP
3+38 TO 3+88	LT.	24" x 12'	2 Conc. Endwall
10+12 TO 10+30	RT.	15" x 15'	CMP
10+60 TO 10+88	LT.	15" x 28'	CMP

FINAL			
ROADWAY CULVERTS			
STATION	SIZE	LENGTH	REMARKS
3+50	9' x 7'	126'	See Plan Sheet #72B
Detour 38+41	60"	50'	To Be Removed

FINAL			
ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
201-5	Clearing	1.3	Acres
202-5	Removing Trees (9"-24")	1	Each
202-6	Removing Trees (over 24")	1	Each
203-9	Earth Excavation	5600	C.Y.
204-10	Structural Earth Excavation - Drainage	1400	C.Y.
204-14	Structural Earth Excavation - Piers	150	C.Y.
205-8	Common Borrow	35,000	C.Y.
205-9	Granular Borrow	8400	C.Y.
302-7	Gravel Base Course - In Place Measurement	3350	C.Y.
302-9	Crushed Gravel Base Course - In Place Measurement	250	C.Y.
302-10	Reinforced Portland Cement Concrete Approach Slabs	600	C.Y.
302-11	Overhaul (In Place Measure)	20	C.Y.
302-12	Overhaul (In Place Measure)	15,000	Y.M.
302-13	Overhaul (In Place Measure)	27,000	Y.M.
302-14	Stripping Pits	20,000	C.Y.
302-15	Gravel Surface Course	100	C.Y.
302-16	Stone Chips	55	ton
302-17	Bituminous Concrete Surface Course Type "A"	470	ton
302-18	Road Tar	2700	Gal.
401-11	15" Corrugated Metal Pipe	90	LF
401-12	24" Corrugated Metal Pipe	60	LF
401-13	30" Corrugated Metal Pipe	120	LF
401-23	Detour Drainage Structures	Lump Sum	LS
701-23	Portland Cement Concrete, Abutments & Retaining Walls	200	C.Y.
701-27	Portland Cement Concrete, Floor Slabs	200	C.Y.
701-28	Portland Cement Concrete, Columns, Column Bases, Bents, Collision Walls, Girders, Struts, Etc.	120	C.Y.
701-39	Portland Cement Concrete, Superstructure Slabs	30	C.Y.
701-40	RCC Roadway and Sidewalk Slabs on Steel Bridges	280	C.Y.
701-45	RCC Culvert Endwalls	14	C.Y.
701-47	Portland Cement	1500	Bbls.
701-50	Wrought Iron Scuppers	6	Each
701-52	R.C.C. Box Culvert Sidewalls, Wingwalls, & Wingwall Footings	140	C.Y.
702-103	Structural Steel, Fabricated & Delivered	182,000	Lbs.
702-104	Structural Steel, Erection	182,000	Lbs.
705-13	Reinforcing Steel, Delivered	115,000	Lbs.
705-14	Reinforcing Steel, Paving	115,000	Lbs.
705-17	Shear Connectors	Lump Sum	LS
708-16	Steel H-beam Piles 42 lbs./ft.	6800	LF
709-6	Membrane Waterproofing	710	S.Y.
710-6	Waterproofing Joints	30	LF
804-6	French Drains	50	C.Y.
804-7	Aluminum Rail, Delivered and Erected	505	LF
901-8	Granite Curb Type "I"	64	LF
905-28A	Temporary Guard Rail - Type "A"	500	LF
905-27	Guard Rail - Type "E"	900	LF
905-27A	Guard Rail - Type "E" (Post 7'-9" Centers)	62	LF
905-31A	Anchorage for Temporary Guard Rail Type "A"	4	Each
905-34	End Wings	1	Each
905-37	Temporary Wooden Guard Fence	1100	LF
907-10	Hand Laid Riprap	30	C.Y.
907-12	Slope Paving for Bridge	450	S.Y.
908-9	Loam Borrow	1100	C.Y.
909-7	Seeding	900	S.Y.
910-10	Seeding - Parkway Mixture	90	Unit
912-6	Hay Mulch	10	ton
914-6	Project Markers	1	Each
915-6	Right of Way Monuments	11	Each
928-6	Portable Barricade With Flashing Warning Lights	Lump Sum	LS
E.W.O.*	Underdrain Type "B"		LF
**	Structural Rock Excav. - Drainage		LF
E.W.O.*3	Repair and add to Slope Paving		C.Y.
E.W.O.*4	Straighten Rockers		FA

PRELIMINARY			
SUMMARY OF CLASSIFIED EXCAVATION AND BORROW			
Total Excavation From Cross Sections*	5600 C.Y.		
Minus Removal of Detour	- 2283 C.Y.		
Grand Total Usable Earth Excavation	3317 C.Y.		
Estimated Earth Shrinkage Factor - 20%	x 80%		
Available Fill From Earth Excavation	2654 C.Y.		
Earth Fill Required From Cross Sections**	42,132 C.Y.		
Minus Removal of Detour and Drives	- 23 C.Y.		
Net Fill Required	42,109 C.Y.		
Minus Available Fill	- 2654 C.Y.		
Deficient Fill Required	39,455 C.Y.		
Estimated Borrow Shrinkage Factor - 10%	x 110%		
Net Common Borrow	43,400 C.Y.		
* Includes Removal of Detour Embankment plus 600 C.Y. from unlisted locations of M&E, E&L, L&L			
** Includes Detour, Removal of Detour and Drives, plus 2014 C.Y. from unlisted locations			

This contract shall include the placing of embankment and the removal of excavation on the interstate road to the lines and grades shown on the cross sections from Station 276+25 to Station 278+25. At these stations the work shall be completed on a line parallel to the centerline of Johnson Rd. and then graded outward from this centerline on a six to one slope parallel to the interstate centerline. This work will not include the placing of any material above the subgrade or the placing of any drainage structures.

The timber cribs on the Johnson Rd. detour are to be 8'x8'x7' high and constructed of 6"x8"x8' timbers spiked at the corners. A timber coping is to be placed over the pipe. These cribs will be paid for in the lump sum bid for the 60" cmp.

QUANTITIES

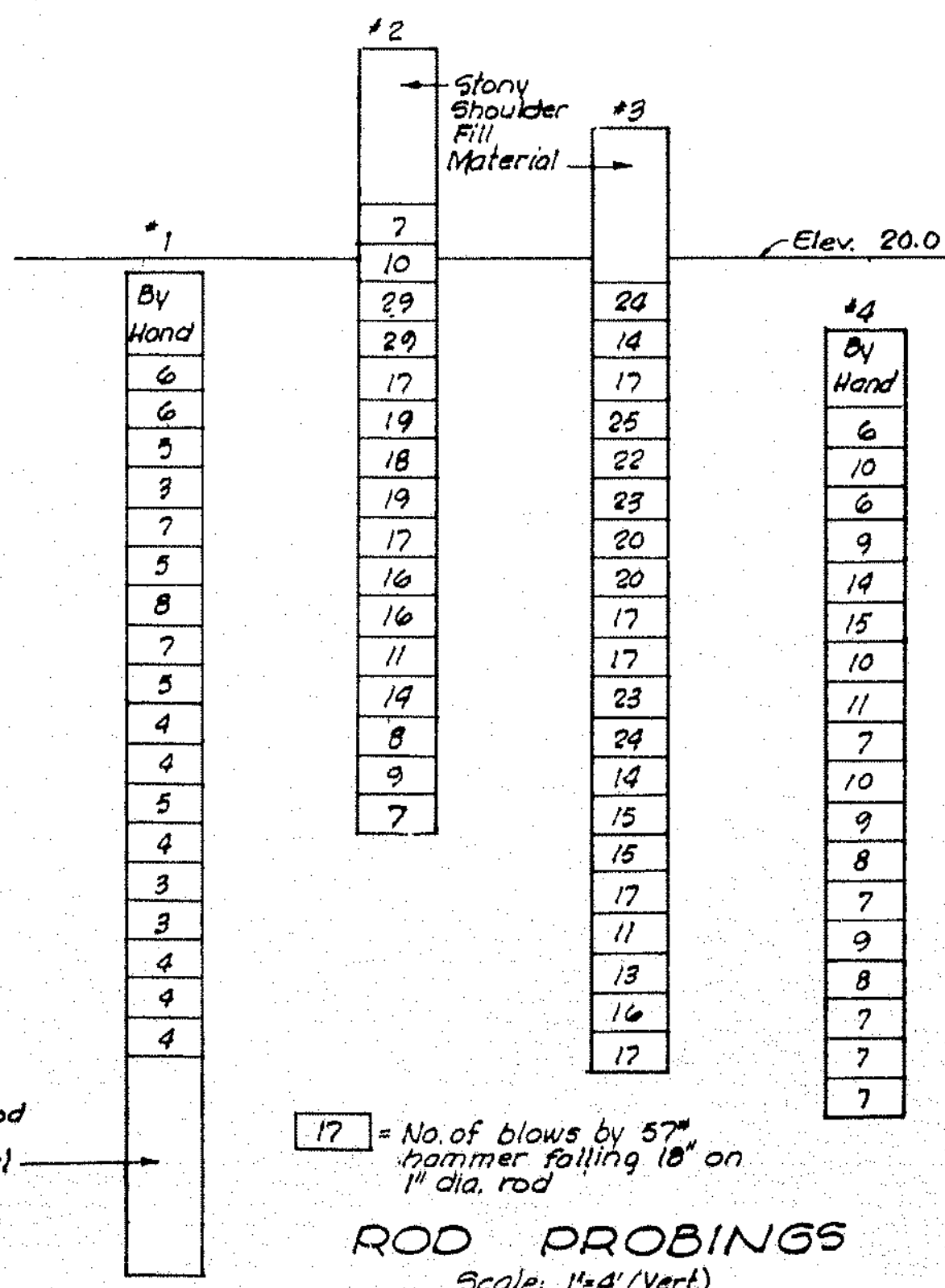
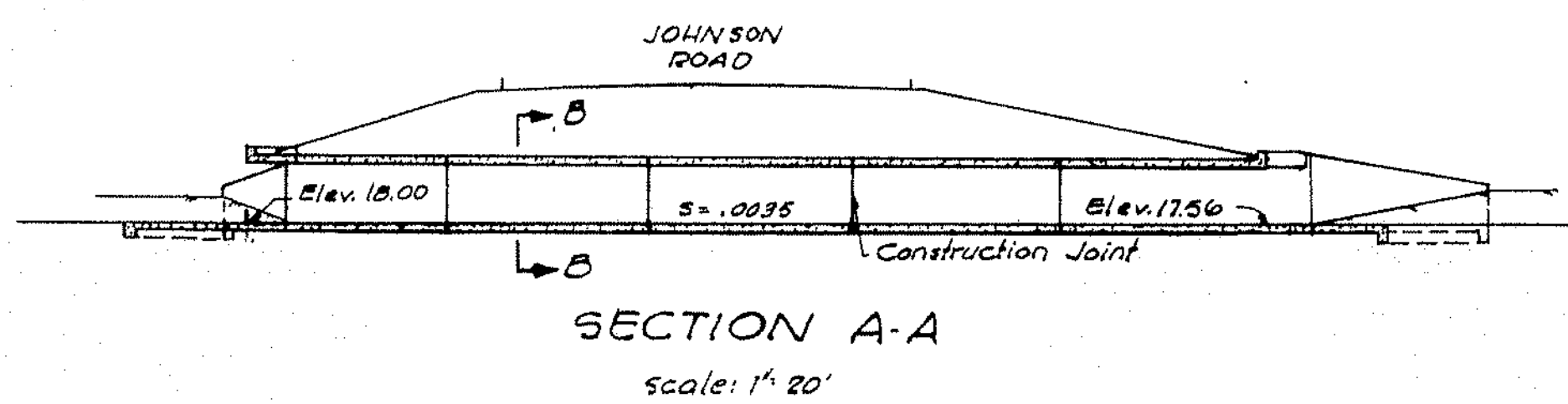
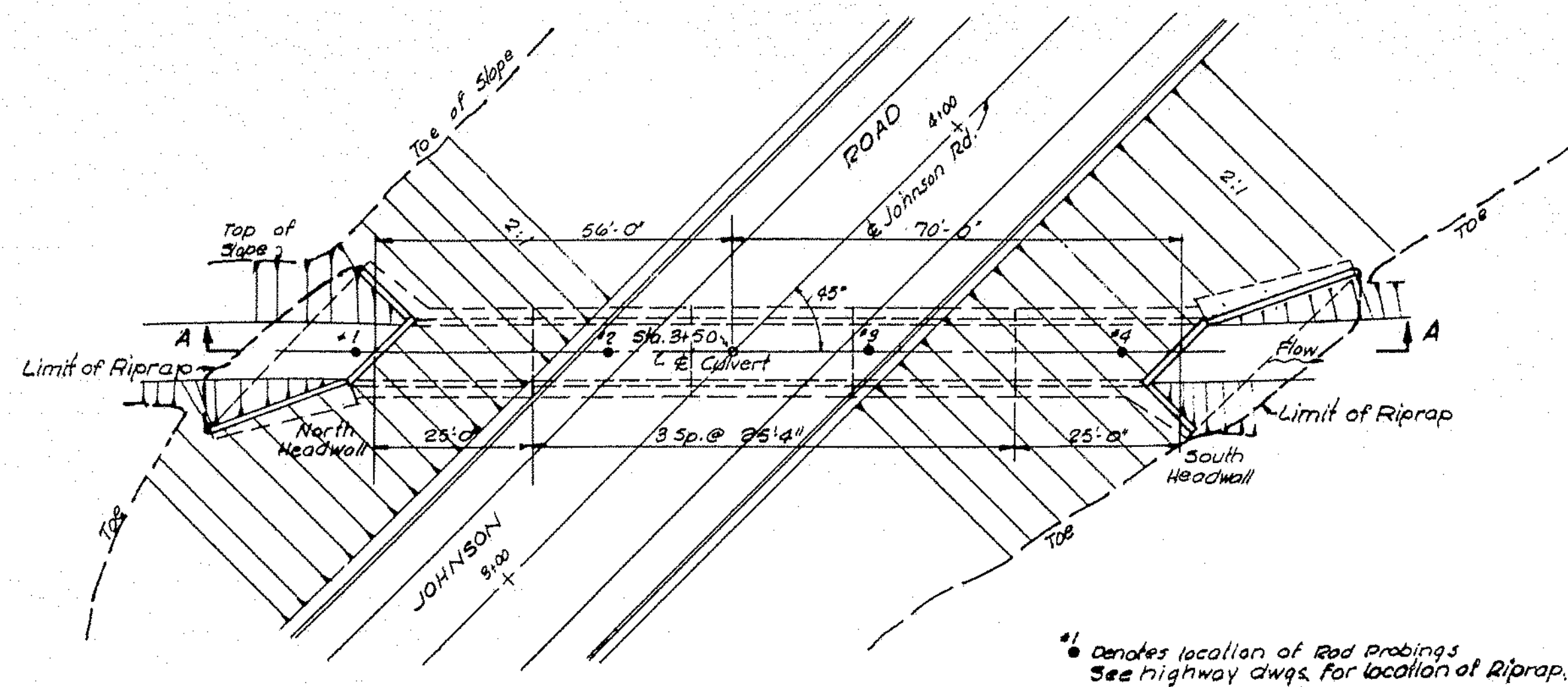
ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
204-10	Structural Earth Excavation Drainage	C.Y.	840
—	Gravel for Foundations	C.Y.	250
701-38	Portland Cement Concrete, Floor Slabs	C.Y.	120
701-39	Portland Cement Concrete, Superstructure Slabs	C.Y.	50
701-47	Portland Cement	Bbl.	475
701-52	Portland Cement Concrete, Box Culvert, Side Walls, and Wing Walls	C.Y.	160
705-13	Reinforcing Steel Delivered	Lb.	27,000
705-14	Reinforcing Steel Placing	Lb.	27,000

GENERAL NOTES

- SPECIFICATIONS:**
A.A.S.H.O. 1953
Maine State Highway Commission, Standard Specifications and Special Provisions
- LIVE LOAD:**
H20-44
- ALLOWABLE STRESSES**
Reinforcing Steel - 18,000 p.s.i.
Concrete - 1,200 p.s.i.
- CONCRETE:**
Class 'A' - Slabs, baffle walls and curbs.
Class 'B' - Side Walls and Wing Walls
- ELEVATIONS**
Elevations are based on Elev. 000 at Mean Sea Level.

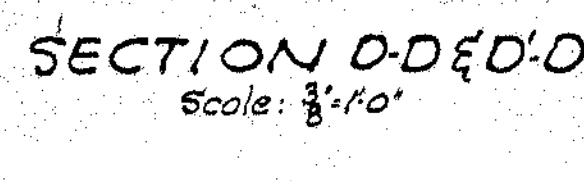
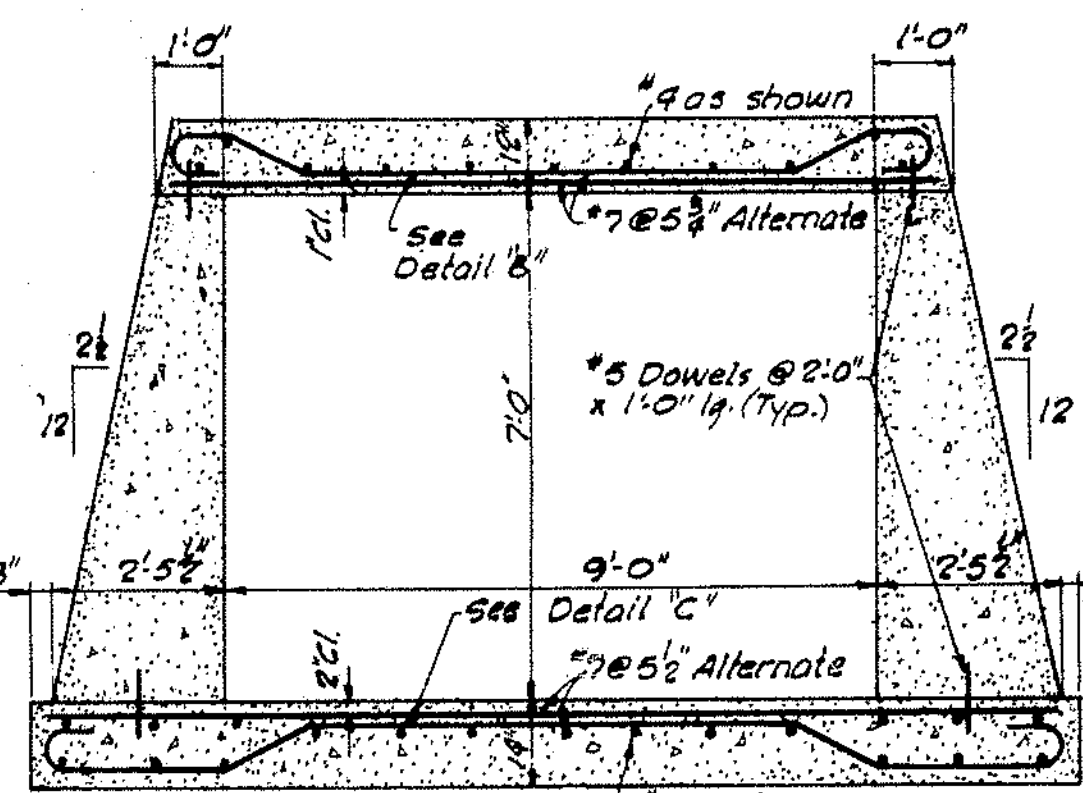
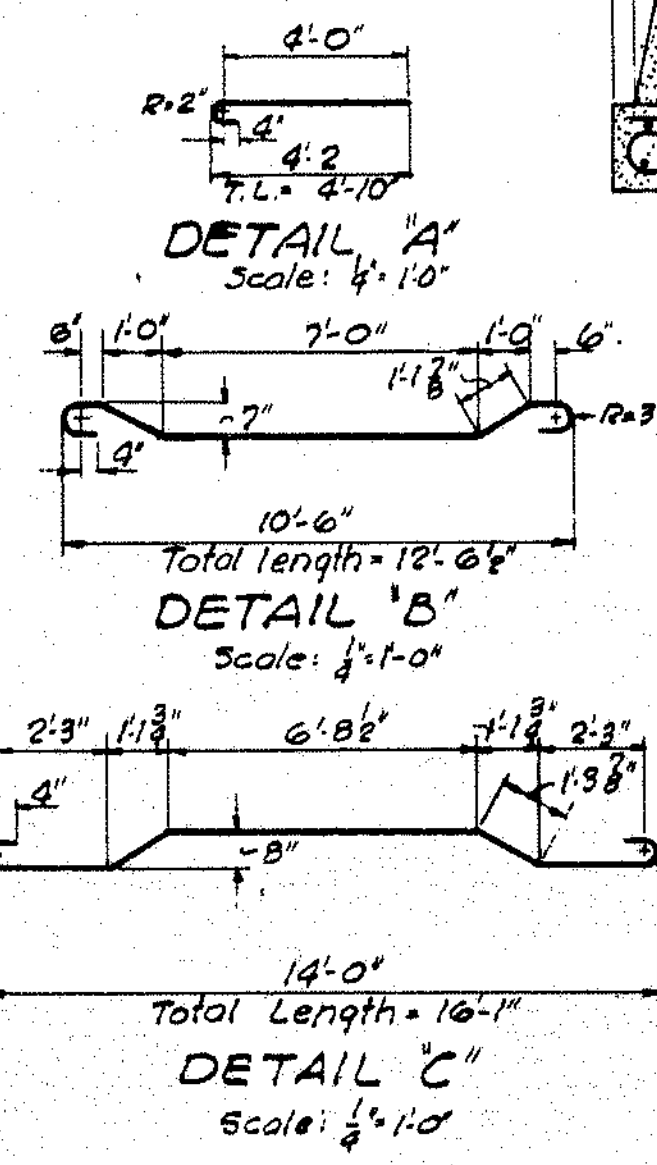
CONSTRUCTION NOTES

- CONSTRUCTION JOINTS**
Cover the construction joints in the side walls on the back side, and the top of the joint in the roof slab with two layers of heavy roofing felt, 10" wide. Coat the surface of the concrete and backs of layers as applied with a suitable grade of roofing cement. Break the bond of construction joints with a coat of asphalt paint. Cut longitudinal bars in roof slab at construction joints. Run longitudinal bars in floor slab through construction joints.
Construction joints in floor slab are optional.
 - SPLICES:**
Splice bars with a 35 diameter lap.
 - CHAMFER:**
Chamfer all exposed corners of concrete $\frac{1}{2}$ ".
- Foundation Note:**
Material below Culvert and Wing Wall Floor Slab deemed unsuitable by the Engineer (after the culvert site has been uncovered) is to be removed and replaced with "gravel for foundations"



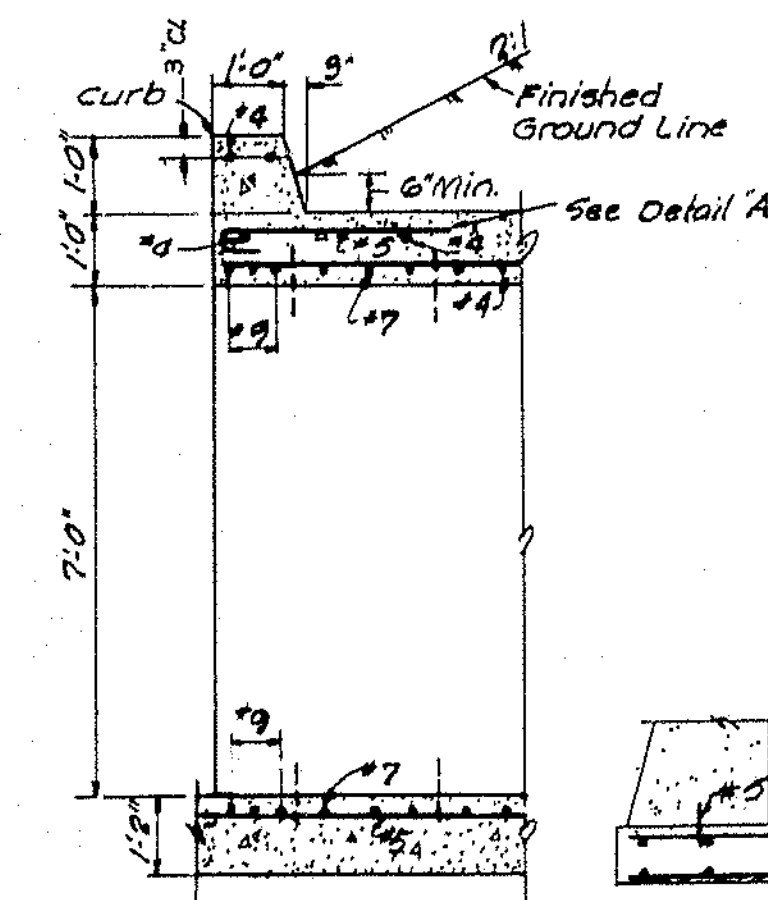
BAR DETAILS

Note: Dimensions to Bars
All bars not detailed to be straight.



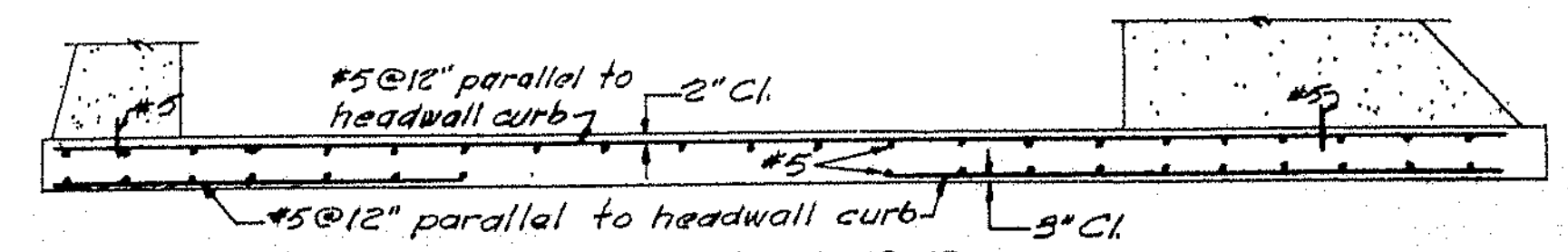
CONSTRUCTION JOINT

Scale: 1" = 1'-0"



KEY DETAIL

No Scale



AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION AUGUSTA, MAINE	
PORTLAND-YARMOUTH INTERSTATE	
BOX CULVERT JOHNSON ROAD STA. 3+50	
SHEET NO. 7 OF 24	SCALE: AS NOTED

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS.

FALMOUTH

11+50 JOHNSON RD. (Reloc.) = 35+64.90 DETOUR

P.O.T. Sta. 13+50
 11+50 JOHNSON RD. (Reloc.) = 35+64.90 DETOUR
 11+50 JOHNSON RD. (Reloc.) = 35+64.90 DETOUR

STA. 12+50 END
 F.A.P. # I-95-4(5)

B.M. #404 Elev. 32.355
 R.R. Spike in PP #44, 30'± East of E of C.N.R. and 15'± South of E of JOHNSON RD.

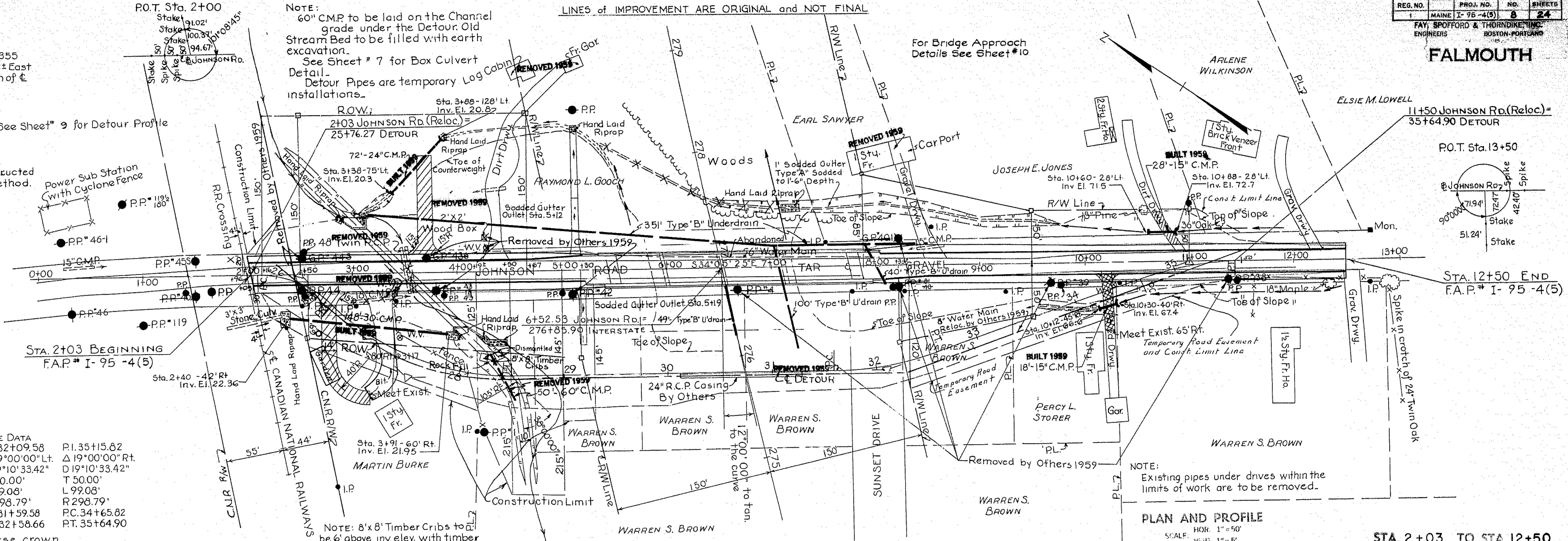
Note: Embankment to be constructed by Controlled Density Method.

See Sheet # 9 for Detour Profile

NOTE: 60" C.M.P. to be laid on the Channel grade under the Detour Old Stream Bed to be filled with earth excavation. See Sheet # 7 for Box Culvert Detail. Detour Pipes are temporary Log Cabin installations.

LINES of IMPROVEMENT ARE ORIGINAL and NOT FINAL

For Bridge Approach Details See Sheet #10



DETOUR CURVE DATA

STA.	STA.	STA.	STA.
PI. 26+23.27	PI. 27+60.39	PI. 32+09.58	PI. 35+15.82
Δ 45°00'00" Rt.	Δ 45°00'00" Lt.	Δ 19°00'00" Lt.	Δ 19°00'00" Rt.
D 57°17'44.88"	D 23°43'58.19"	D 19°10'33.42"	D 19°10'33.42"
T 41.42'	T 100.00'	T 50.00'	T 50.00'
L 78.54'	L 189.61'	L 99.08'	L 99.08'
R 100.00'	R 241.42'	R 298.79'	R 298.79'
P.C. 25+01.85	P.R.C. 26+60.39	P.C. 31+59.58	P.C. 34+65.82
P.R.C. 26+60.39	P.T. 28+50.00	P.T. 32+58.66	P.T. 35+64.90

Remove adverse crown.

CRUSHED GRAVEL BASE COURSE

STA.	STA.	SIDE	DEPTH
2+07	Bridge	Lt. & Rt.	6"
12+50	Bridge	Lt. & Rt.	6"

WIDTH OF SURFACE

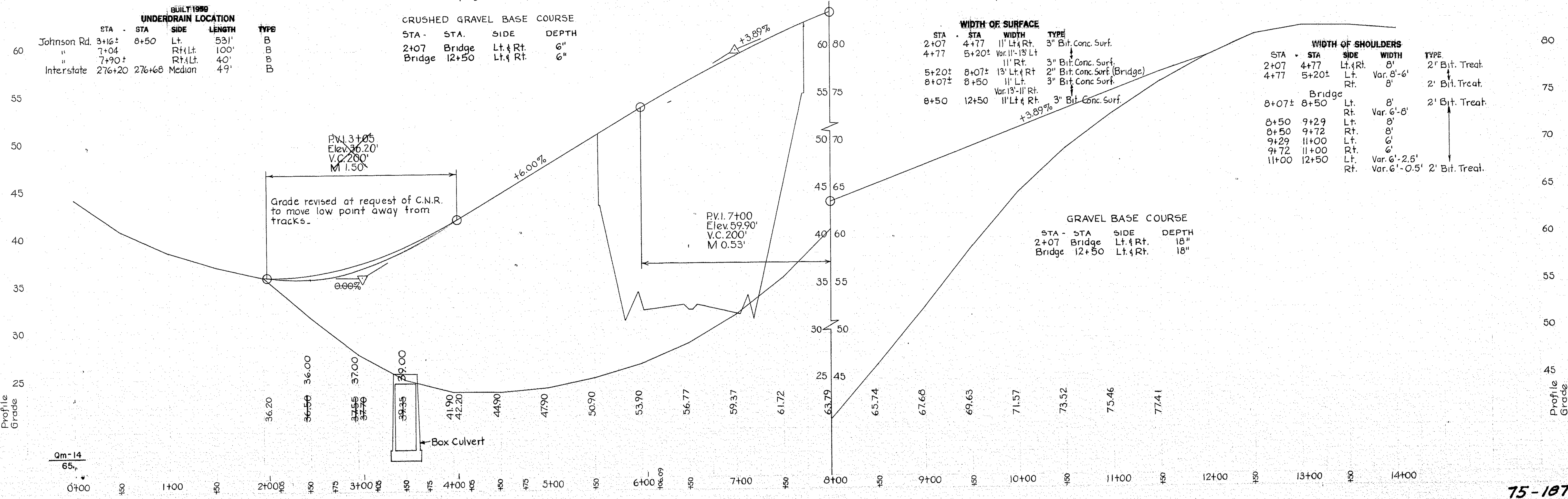
STA.	STA.	WIDTH	TYPE
2+07	4+77	11' Lt. & Rt.	3" Bit. Conc. Surf.
4+77	5+20±	Var. 11'-13' Lt.	3" Bit. Conc. Surf.
5+20±	8+07±	13' Lt. & Rt.	2" Bit. Conc. Surf. (Bridge)
8+07±	8+50	11' Lt. & Rt.	3" Bit. Conc. Surf.
8+50	12+50	11' Lt. & Rt.	3" Bit. Conc. Surf.

WIDTH OF SHOULDERS

STA.	STA.	SIDE	WIDTH	TYPE
2+07	4+77	Lt. & Rt.	8'	2' Bit. Treat.
4+77	5+20±	Lt. & Rt.	Var. 8'-6'	2' Bit. Treat.
8+07±	8+50	Lt. & Rt.	8'	2' Bit. Treat.
8+50	9+29	Lt. & Rt.	Var. 6'-8'	2' Bit. Treat.
9+29	9+72	Lt. & Rt.	8'	2' Bit. Treat.
9+72	11+00	Lt. & Rt.	6'	2' Bit. Treat.
11+00	12+50	Lt. & Rt.	Var. 6'-2.5'	2' Bit. Treat.

GRAVEL BASE COURSE

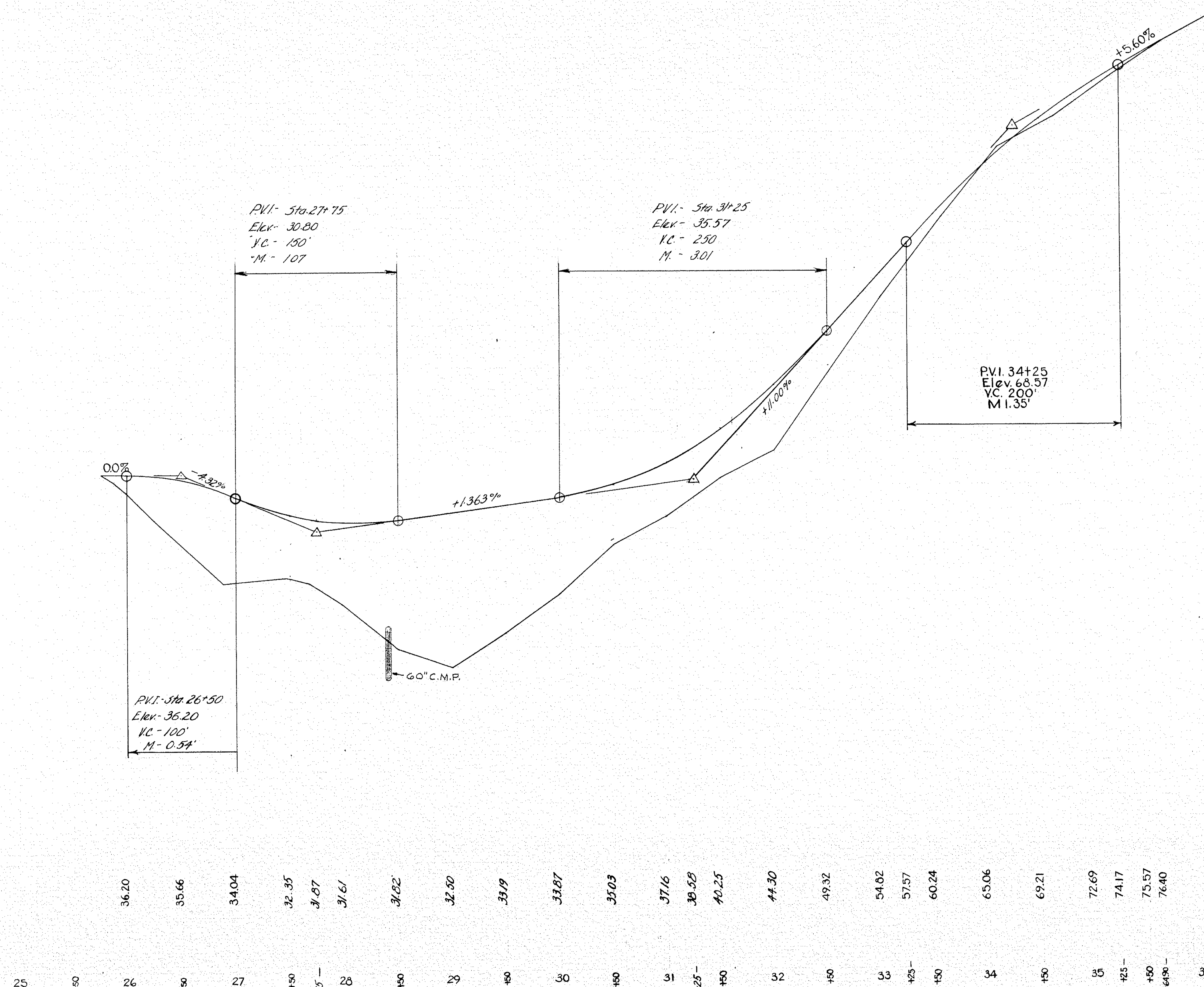
STA.	STA.	SIDE	DEPTH
2+07	Bridge	Lt. & Rt.	18"
12+50	Bridge	Lt. & Rt.	18"



PROFILE - JOHNSON RD. DETOUR
FALMOUTH

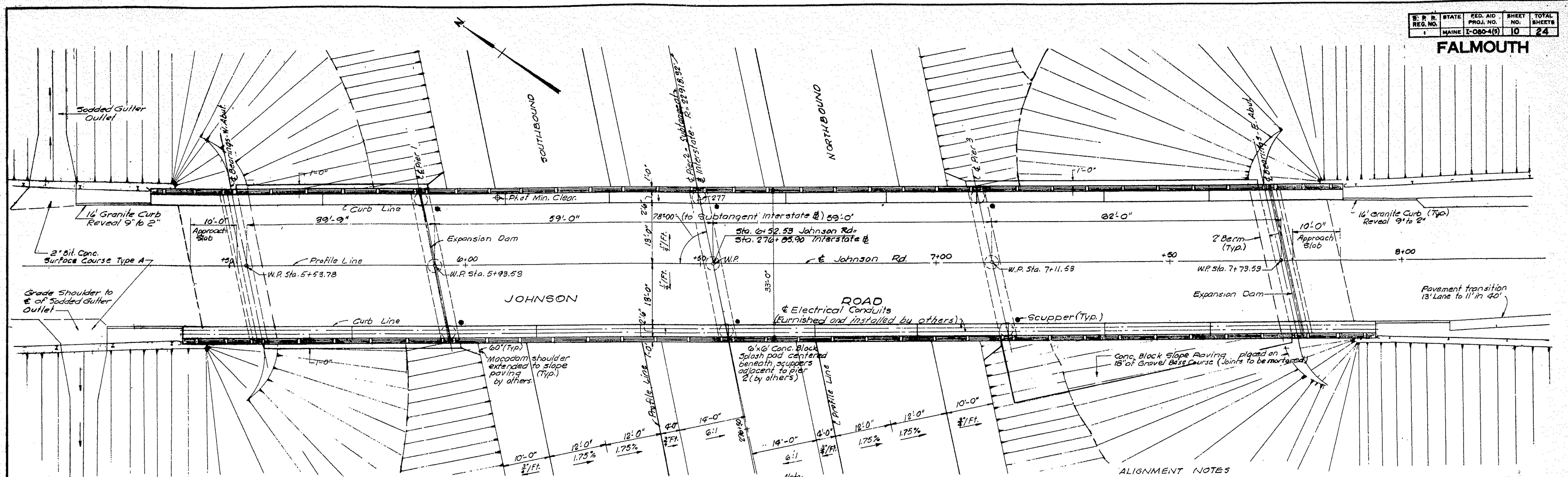
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Rt Edge Profile
Lt Edge Profile
Grade
Pvmt.

Rt Edge Profile
Lt Edge Profile
Grade
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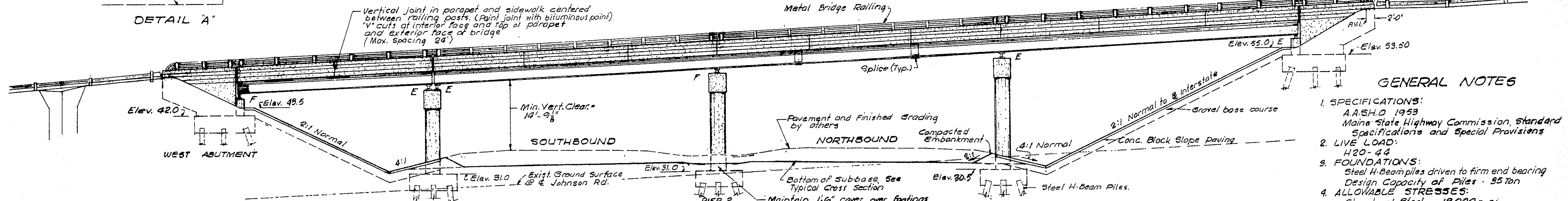


PLAN
Scale: 1"=10'

Note: Grading shown in Plan for ultimate construction. Grading of Interstate above bottom of sub-base not in this contract.

- ALIGNMENT NOTES
1. Abutments and Piers are parallel to the Subtangent Interstate 95.
 2. All stringers and Wingwalls are parallel to E. Johnson Road.

DETAIL A"

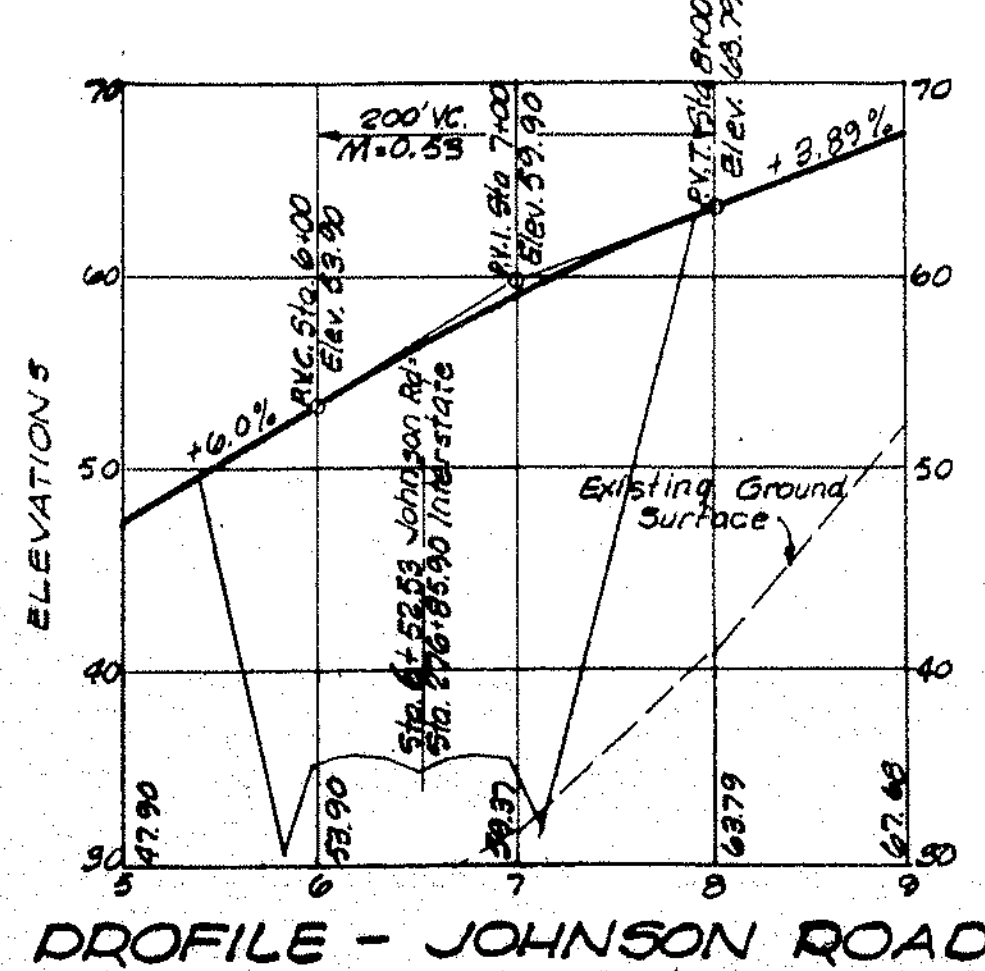


ELEVATION
Scale: 1"=10'

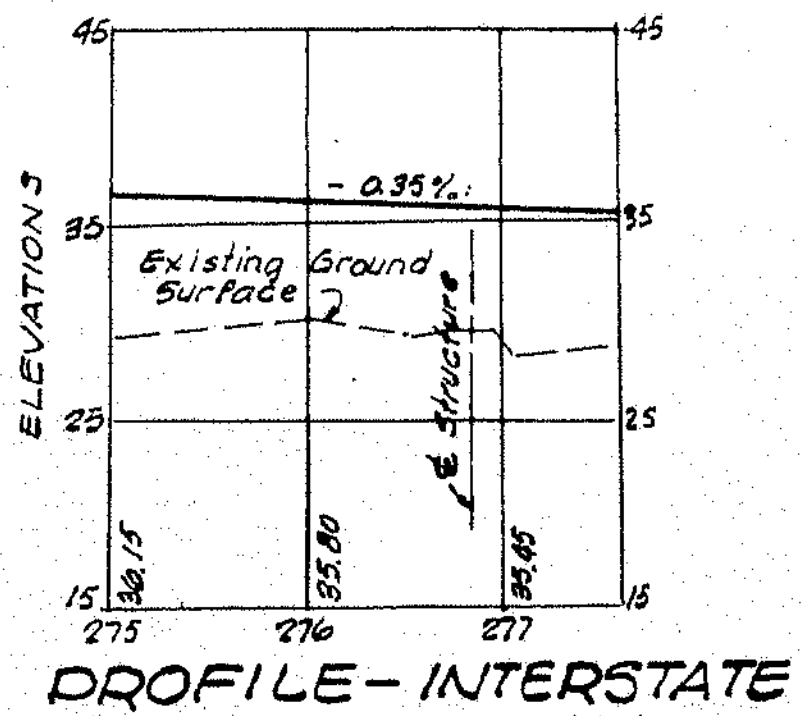
Note: Grading shown in Elevation for present construction. Fill under abutments shall be placed and compacted to elevation of bottom of footings before piles are driven.

GENERAL NOTES

1. SPECIFICATIONS: A.A.S.H.O. 1953 Maine State Highway Commission Standard Specifications and Special Provisions
2. LIVE LOAD: H20-44
3. FOUNDATIONS: Steel H-Beam piles driven to firm end bearing Design Capacity of Piles - 95 Ton
4. ALLOWABLE STRESSES: Structural Steel 18,000 p.s.i. Reinforcing Steel 18,000 p.s.i. Concrete 1,200 p.s.i.
5. CONCRETE: Class A-1 Footings, Piers, Abutments, Approach Slabs and Deck
6. ELEVATIONS: Based on Elev. 0.00 at Mean Sea Level



PROFILE - JOHNSON ROAD
Scale: Hor. 1"=100' Vert. 1"=10'



PROFILE - INTERSTATE
Scale: Hor. 1"=100' Vert. 1"=10'

ESTIMATED QUANTITIES					
ITEM	DESCRIPTION	UNIT	QUANTITY	ITEM	DESCRIPTION
204-14	Structural Earth Excavation - Piers	C.Y.	150	705-13	Reinforcing Steel, Delivered
302-7	Gravel Base Course, In Place Measurement	C.Y.	250	705-14	Reinforcing Steel, Placing
307-8	Reinforced Portland Cement Concrete Approach Slabs	S.Y.	60	705-17	Shear Connectors
404-28	Bituminous Conc. Surface Course, Type A	Ton	93	708-16	Steel H-Beam Piles 42 Lbs./Ft.
701-33	Portland Cement Concrete, Abutments and Retaining Walls	C.Y.	200		
701-37	Portland Cement Concrete, Substructure Columns, Column Bases, Bents, Collision Walls, Girders, Struts, etc.	C.Y.	200	709-6	Membrane Waterproofing
701-40	Portland Cement Concrete, Roadway and sidewalk Slab on Steel Bridges	C.Y.	250	710-6	Waterproofing Joints
701-47	Portland Cement	Bbls.	1,000	804-6	French Drains
701-50	Wrought Iron Scuppers	Each	6	806-7	Aluminum Rail, Delivered and Erected
701-108	Structural Steel, Fabricated and Delivered	Lbs.	182,000	907-12	Slope Paving for Bridge
701-104	Structural Steel, Erection	Lbs.	182,000		

Revised Limit of Slope Paving in Southeast corner 6-18-59

AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION
AUGUSTA, MAINE

PORTLAND-YARMOUTH INTERSTATE

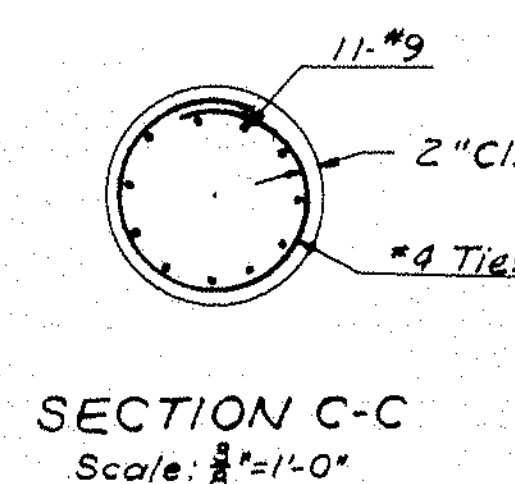
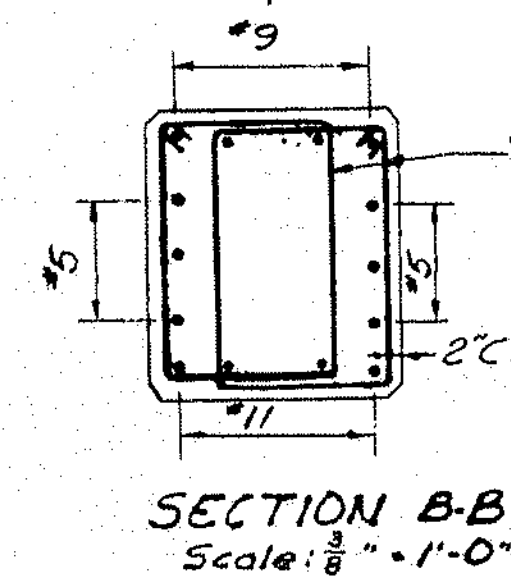
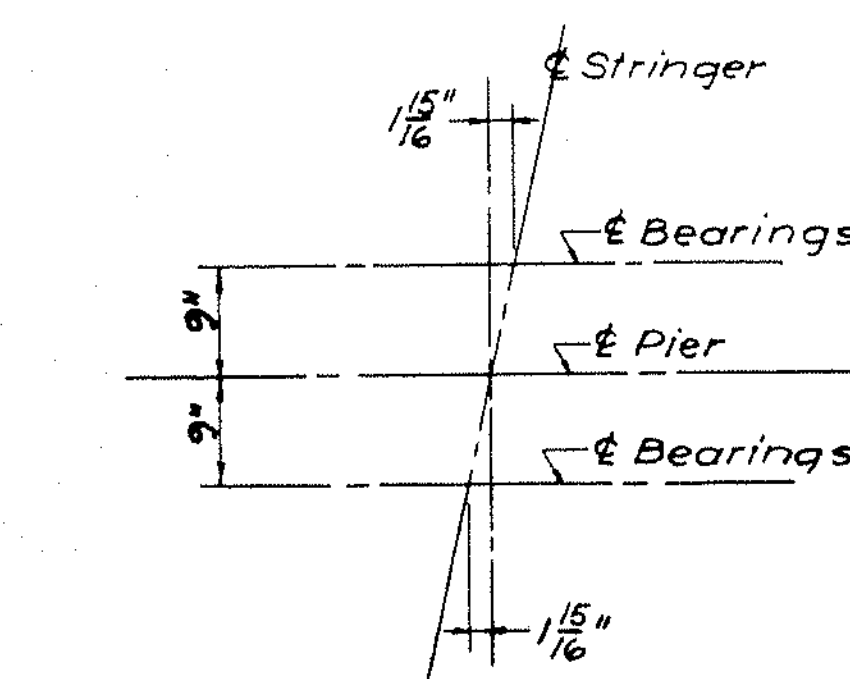
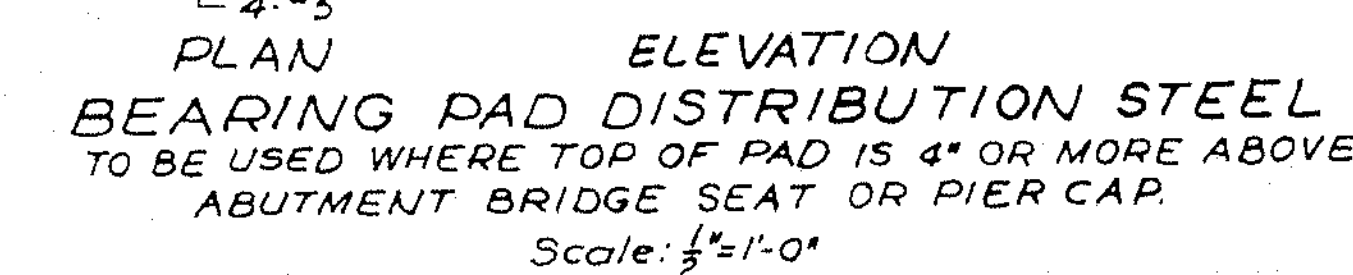
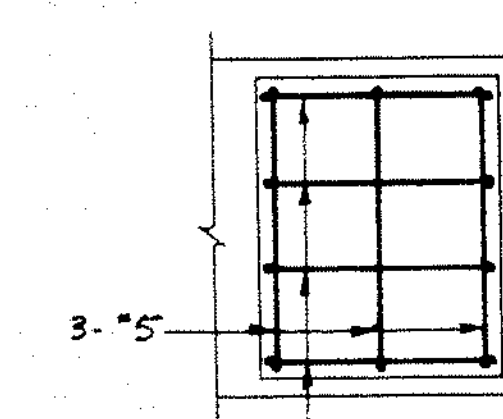
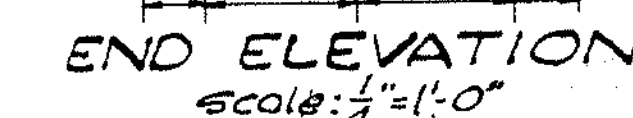
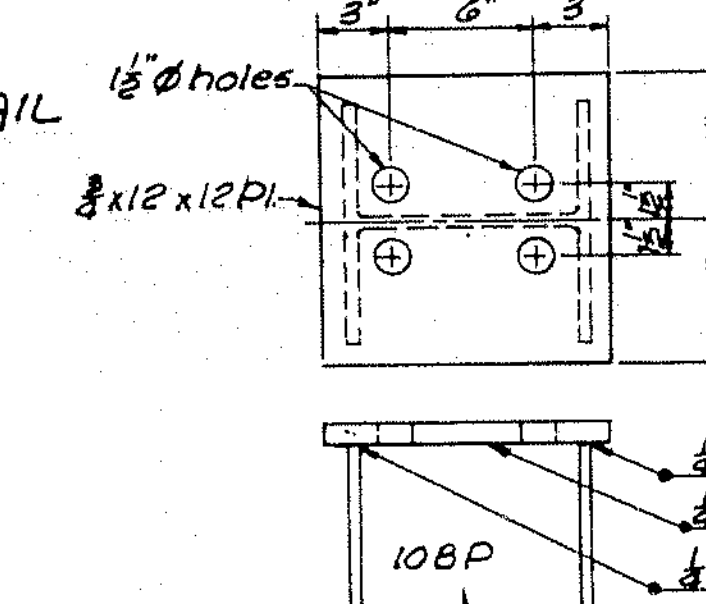
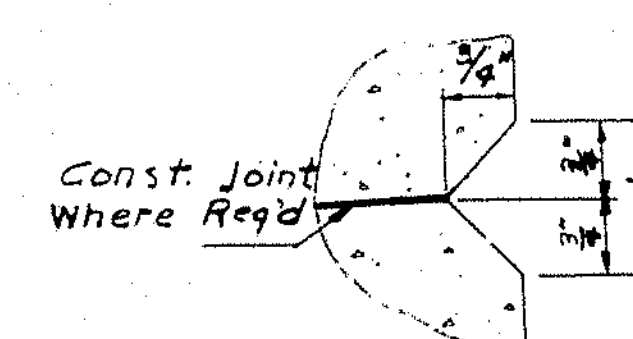
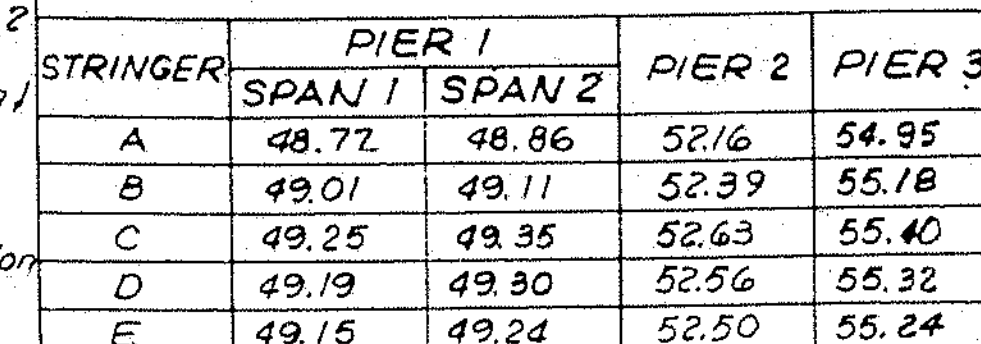
JOHNSON ROAD OVER INTERSTATE

GENERAL PLAN AND ELEVATION

SHEET NO. 10 OF 24 SCALE: AS NOTED

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS.

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1. Reinforcing steel to have 2" min. concrete cover unless otherwise noted.
2. All bar splices to lap 20 diameters (12" min.) unless otherwise noted.
3. All bar embedments to be 35 diameters unless otherwise noted.
4. Bearing pads to be of sufficient height to permit bush hammering to the proper elevation.
5. All bearing pads to be placed integrally with the piers and abutments.
6. All exposed corners except on bearing pads to have a 3/4" chamfer. Bearing pads to have tooled edges.
7. Reinforcing steel in or beneath bearing pads to be positioned to clear swedge anchor bolts. For swedge anchor bolts see bearing types on Sh.Nol.6

PIER DETAILS

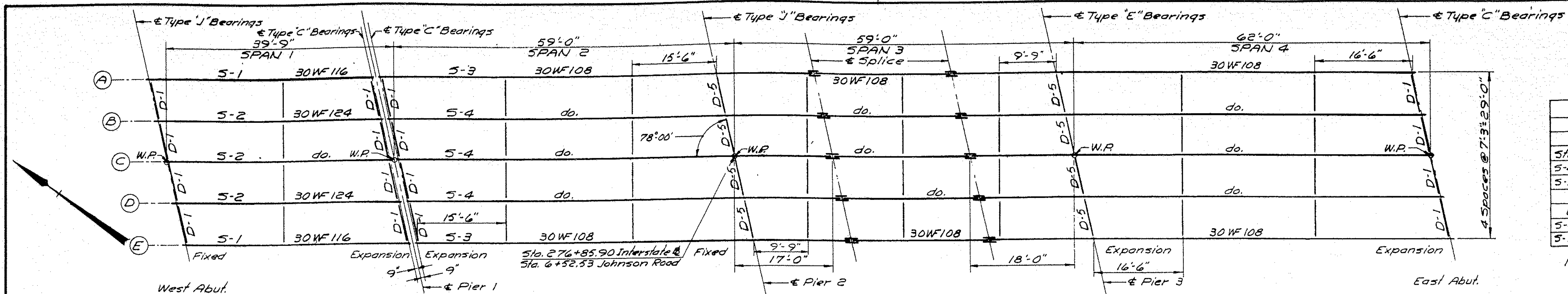
FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS

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FALMOUTH

SHEAR CONNECTORS									
SPIRAL SHEAR CONNECTORS									
A	B	C	D	E					
Str	Lgth	Pitch	Lgth	Pitch	Lgth	Pitch	Lgth	Pitch	Lgth
5-4	12'-0"	2@8"	8'-0"	2@12"	10'-0"	2@15"	7'-0"	2@12"	15'-0"
5-3	10'-0"	2@8"	10'-0"	2@12"	9'-0"	1@18"	12'-0"	2@12"	9'-0"
2@8" denotes double spiral @ 8" pitch									
EQUIVALENT STUD SHEAR CONNECTORS									
5-4	12'-0"	5/8"	8'-0"	8/8"	10'-0"	11"	7'-0"	8/8"	15'-0"
5-3	10'-0"	5/8"	10'-0"	8/8"	9'-0"	18"	12'-0"	8/8"	9'-0"

Note: Stud shear connector pitch is given for 3-#4 studs.

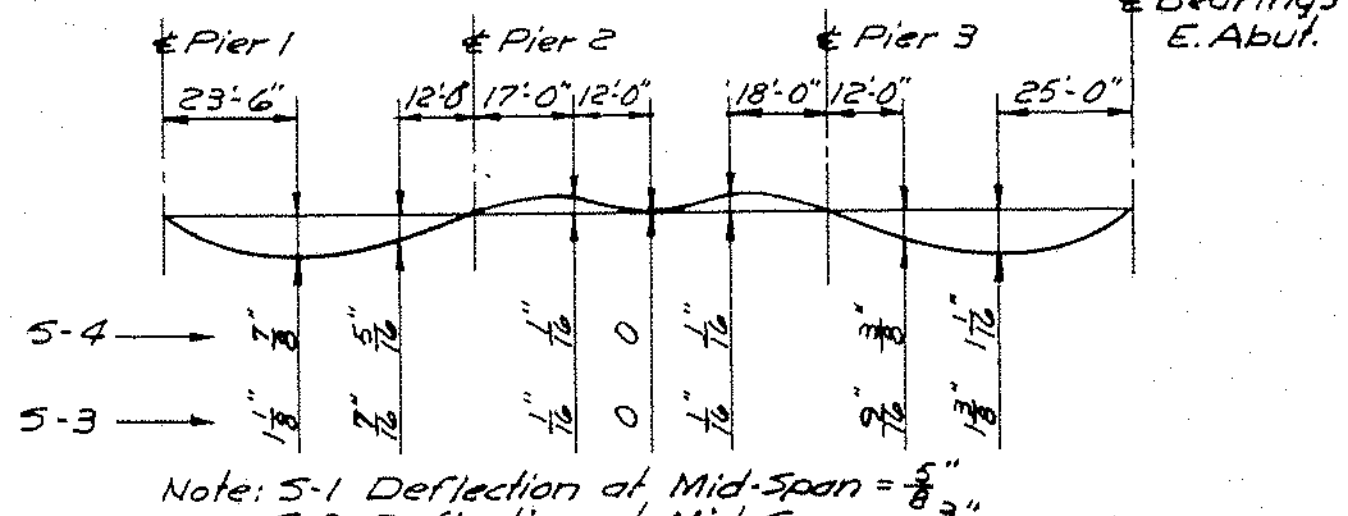


Note: All Diaphragms are D-2 unless otherwise noted.

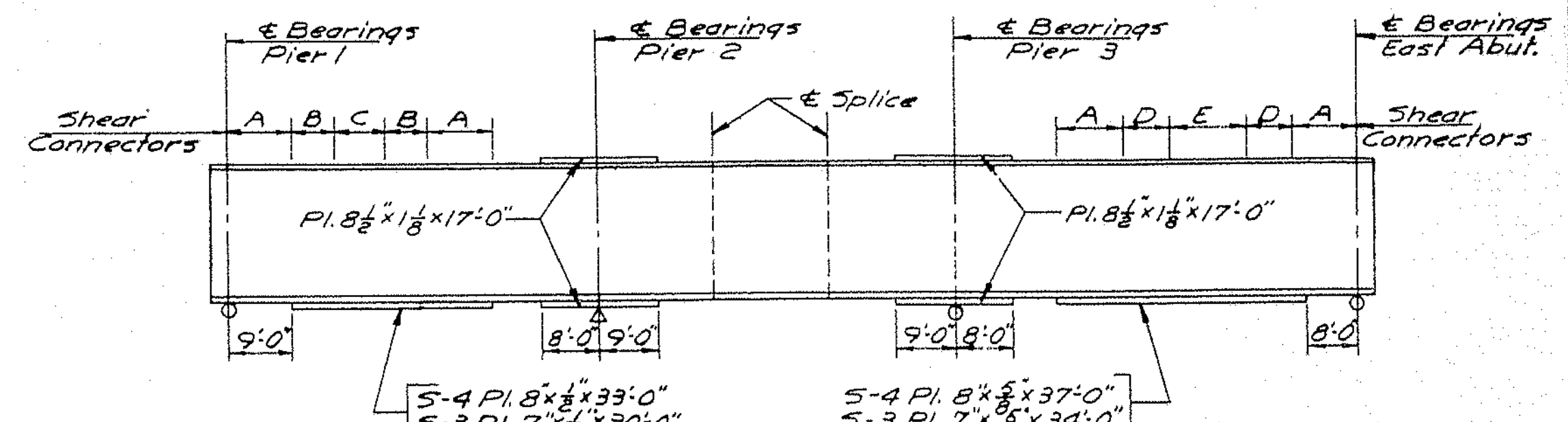
FRAMING PLAN
 Scale: 1" = 10'

FRAMING NOTES

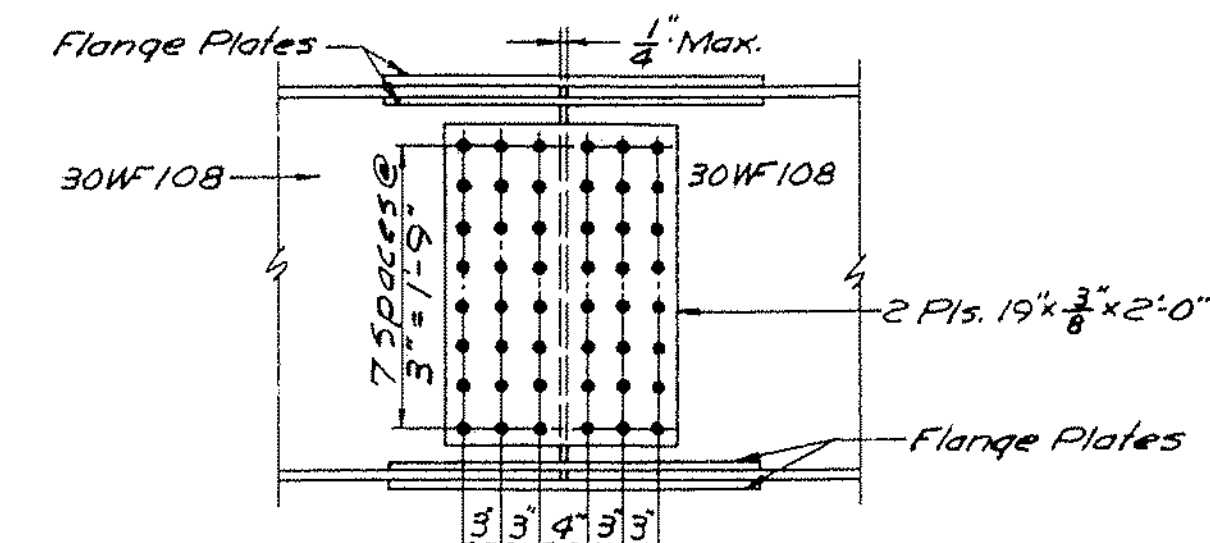
- For diaphragm, bearings, and shear connector details see Sheet No. 16.
- All dimensions shown on Framing Plan are horizontal.
- Stringers not to be cambered but shall be erected with natural bow up. Camber to follow road profile to be obtained by angular adjustment at splices.



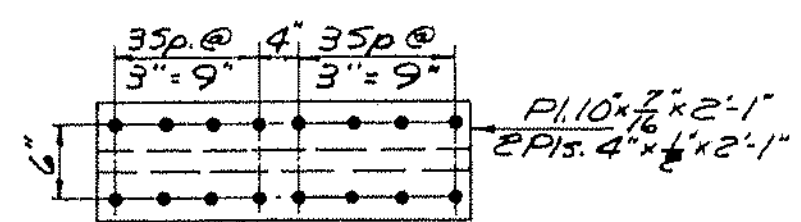
DEAD LOAD DEFLECTION
 No Scale



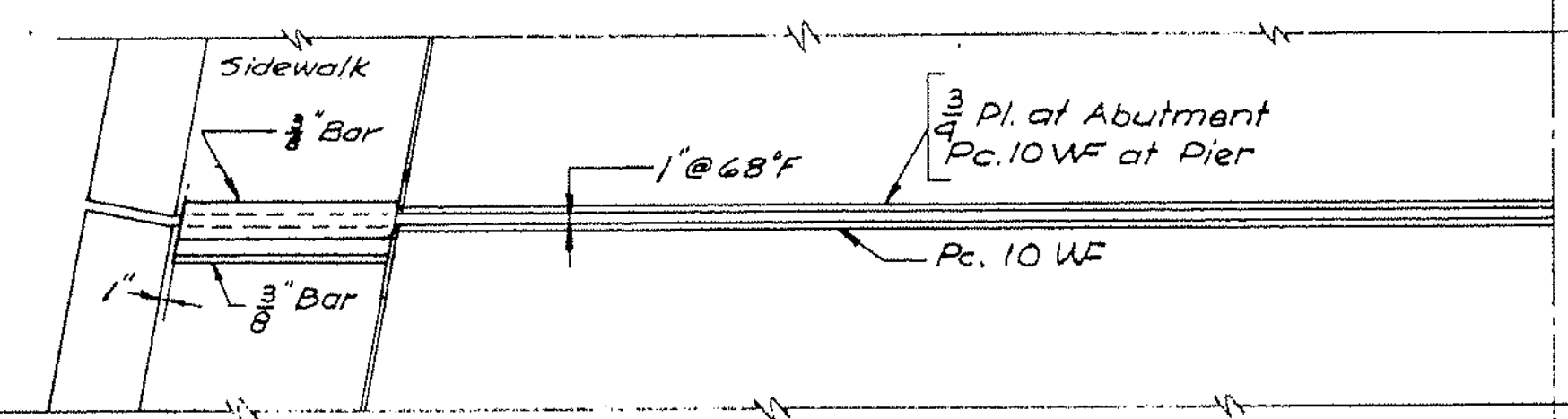
STRINGER ELEVATION
 SPANS 2, 3 & 4
 No Scale



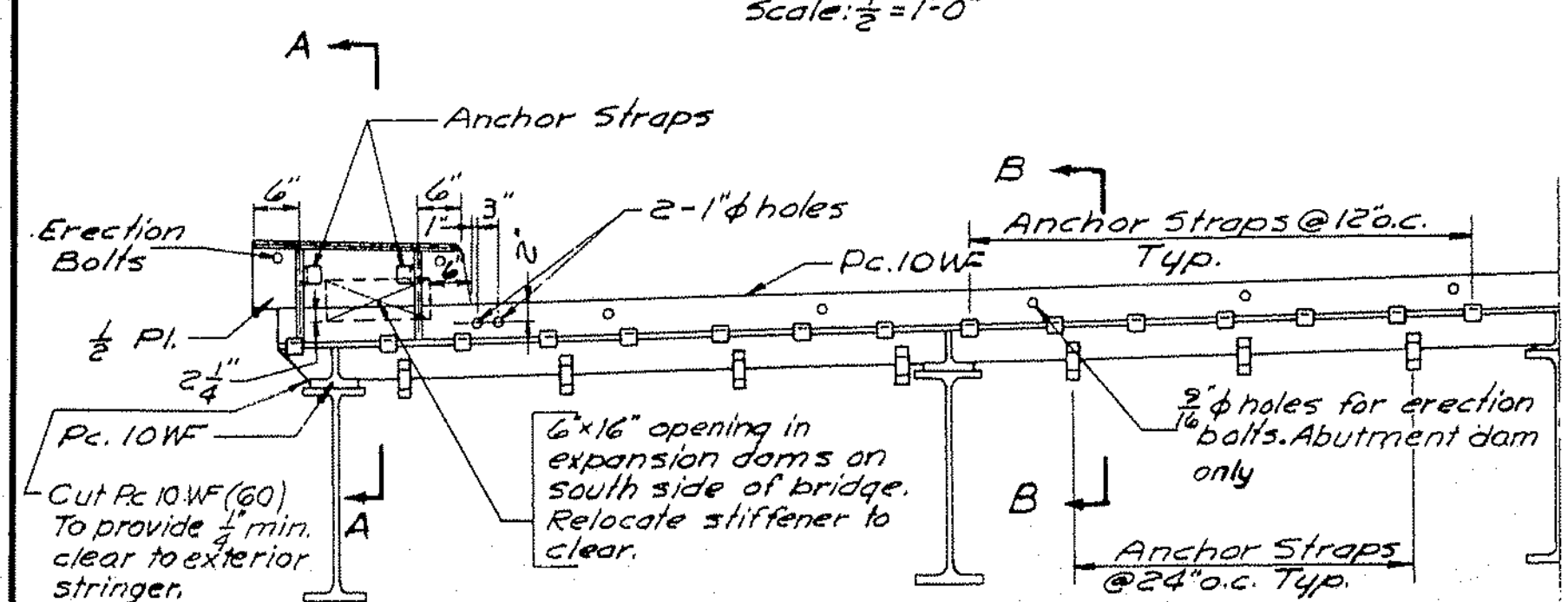
ELEVATION



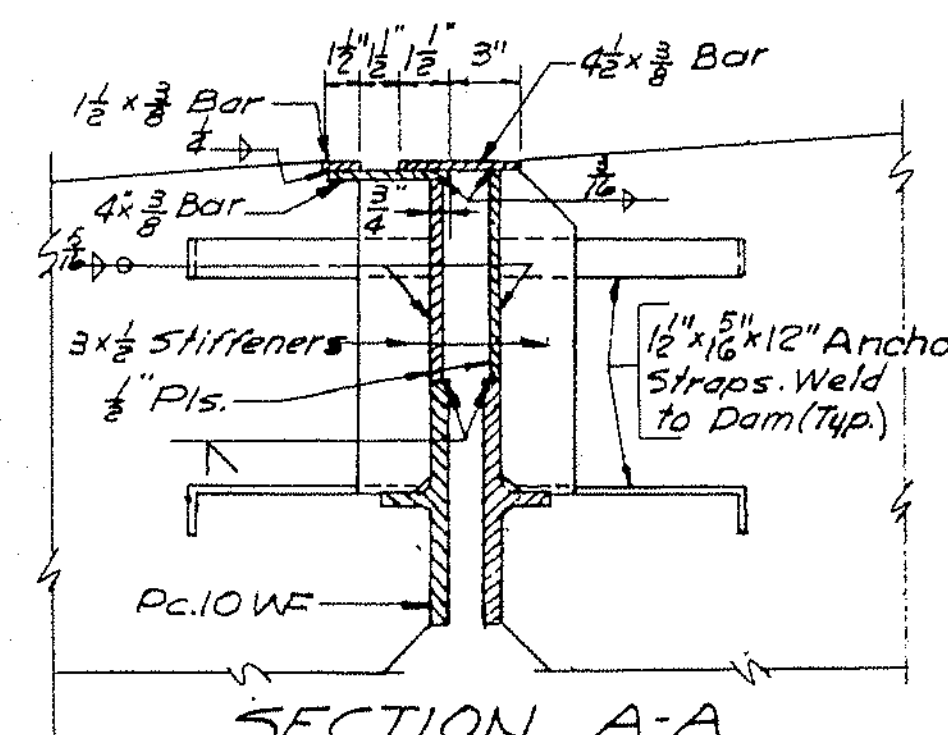
FLANGE PLATES
 STRINGER SPLICE DETAILS
 No Scale



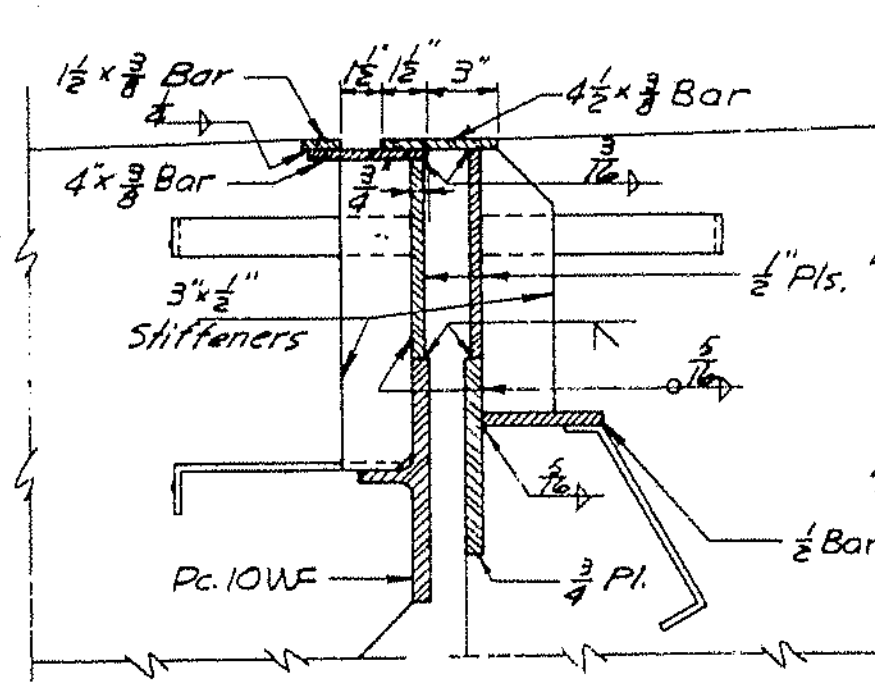
PLAN
 Scale: 1/2" = 1'-0"



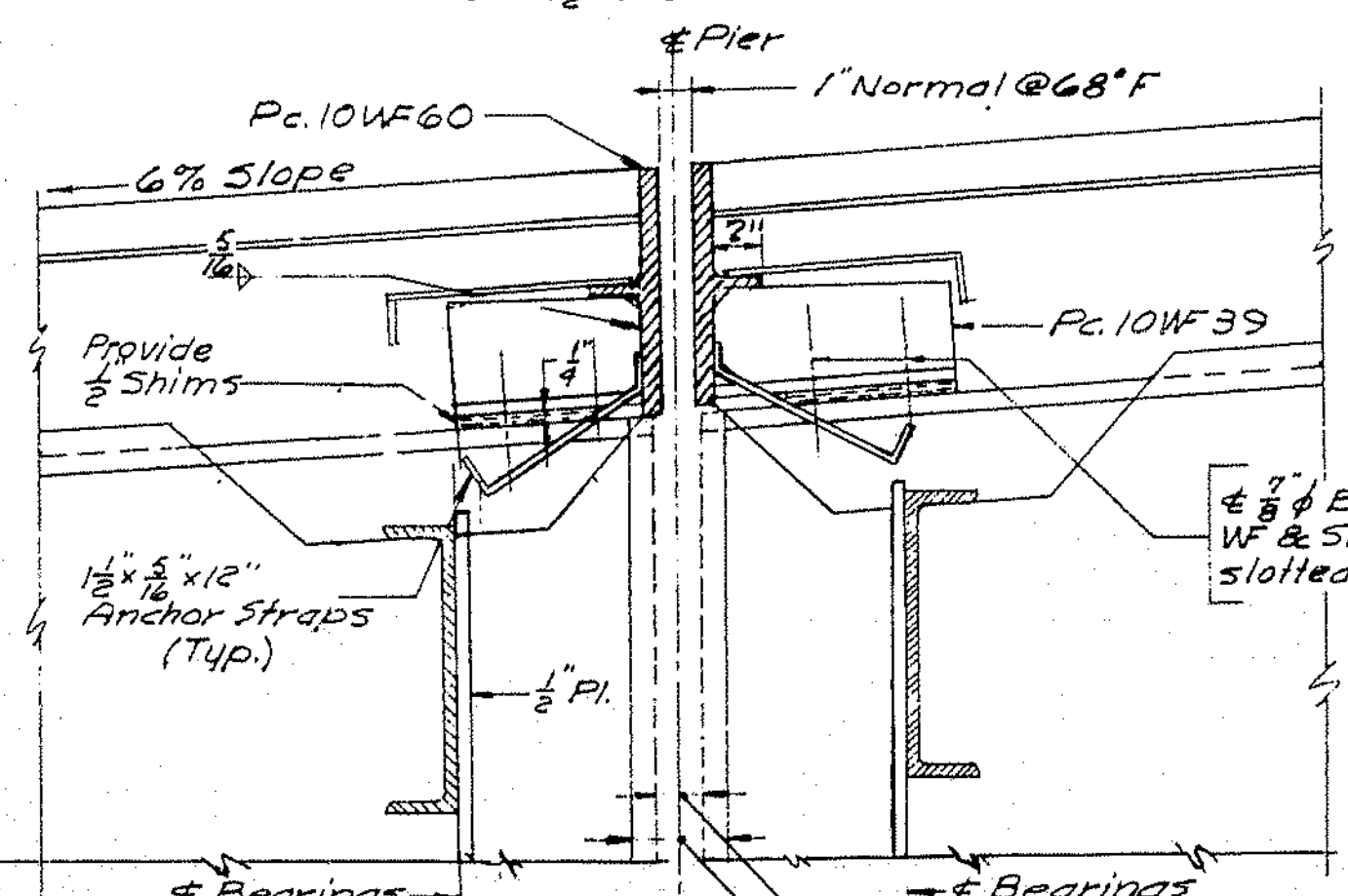
ELEVATION
 Scale: 1/2" = 1'-0"



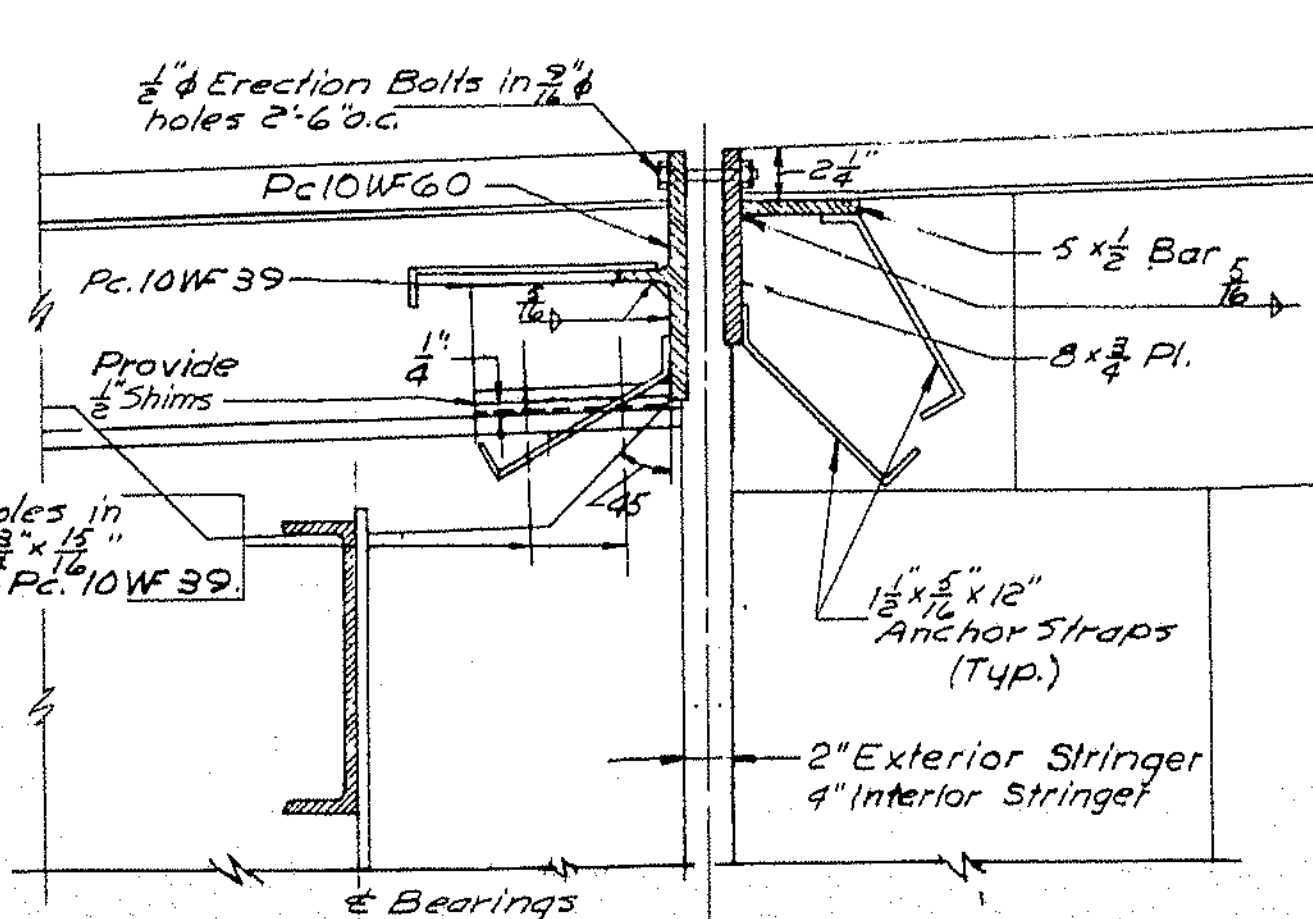
SECTION A-A
 (AT PIER 1)
 Scale: 1/2" = 1'-0"



SECTION A-A
 (AT EAST ABUTMENT)
 Scale: 1/2" = 1'-0"



SECTION B-B
 (AT PIER 1)
 Scale: 1/2" = 1'-0"



SECTION B-B
 (AT EAST ABUTMENT)
 Scale: 1/2" = 1'-0"

EXPANSION DAM DETAILS

AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION
 AUGUSTA, MAINE

PORTLAND-YARMOUTH INTERSTATE

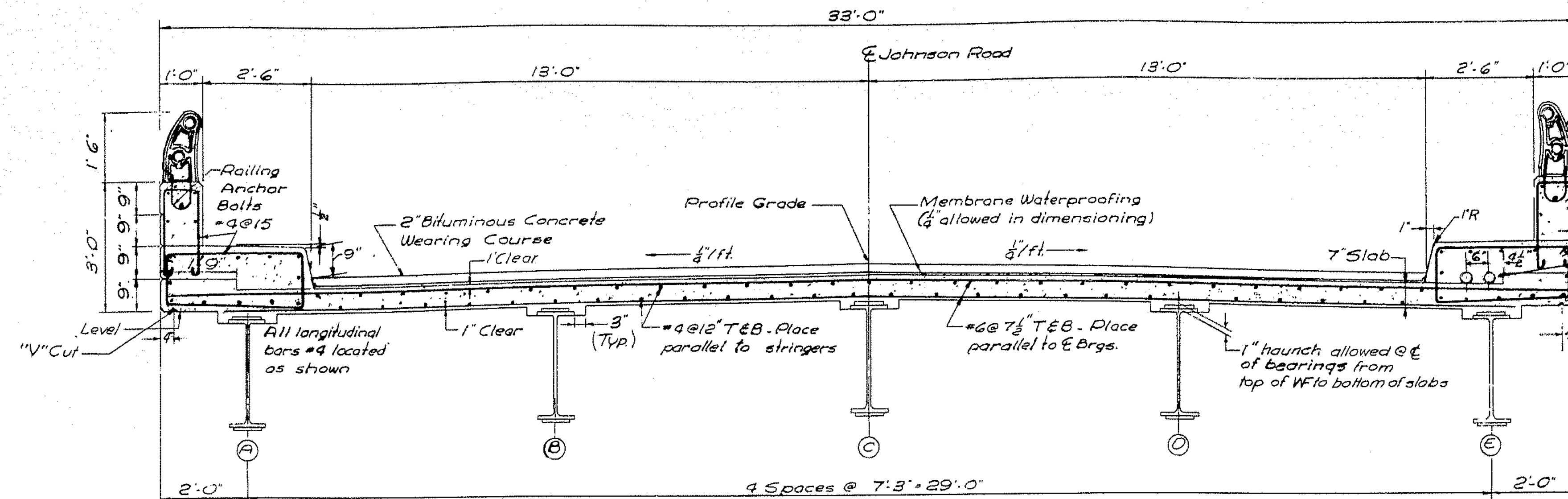
JOHNSON ROAD OVER INTERSTATE

FRAMING PLAN AND DETAILS

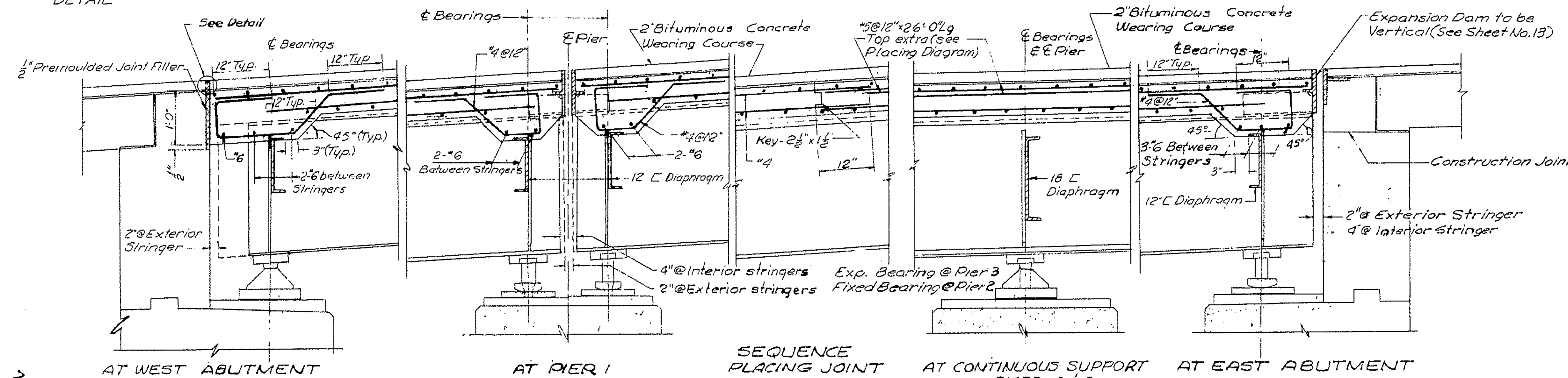
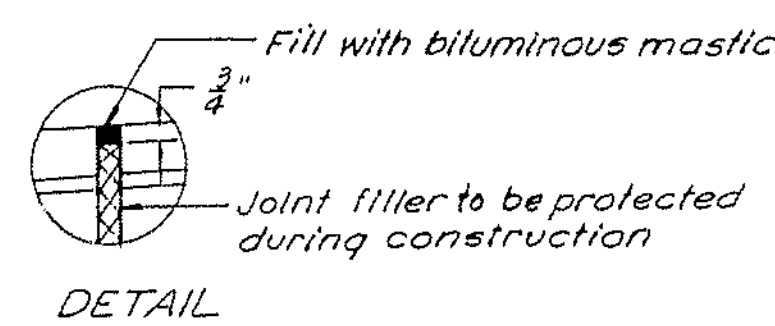
SHEET NO. 13 OF 24 SCALE: AS NOTED

FAY, SPOFFORD & THORNDIKE, INC.
 ENGINEERS BOSTON, MASS.

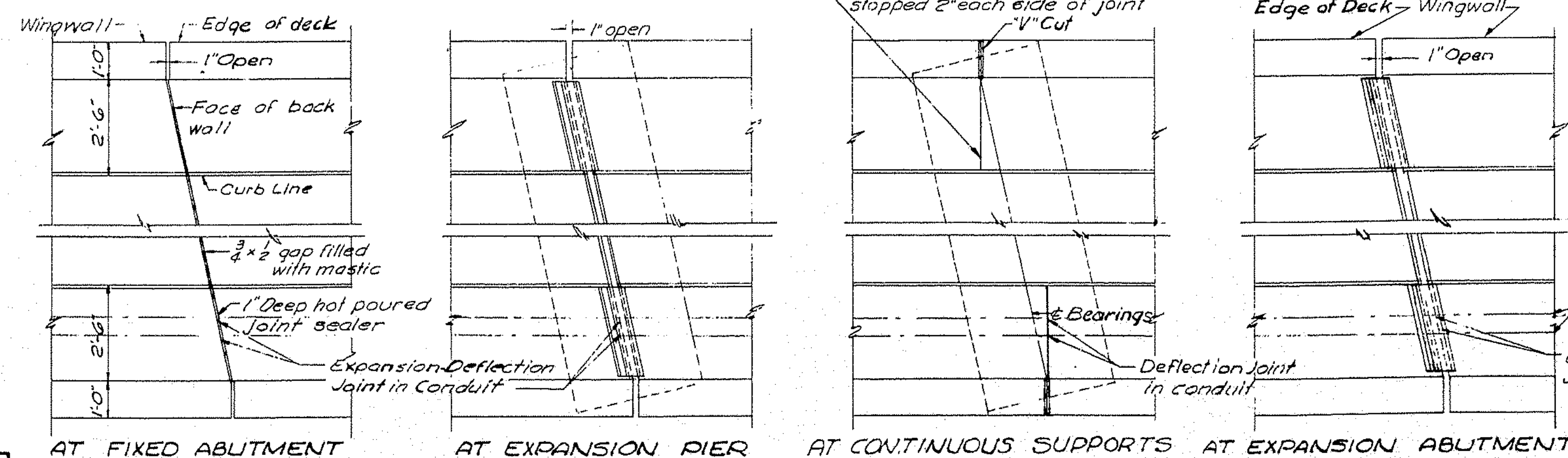
Qm-14
 24



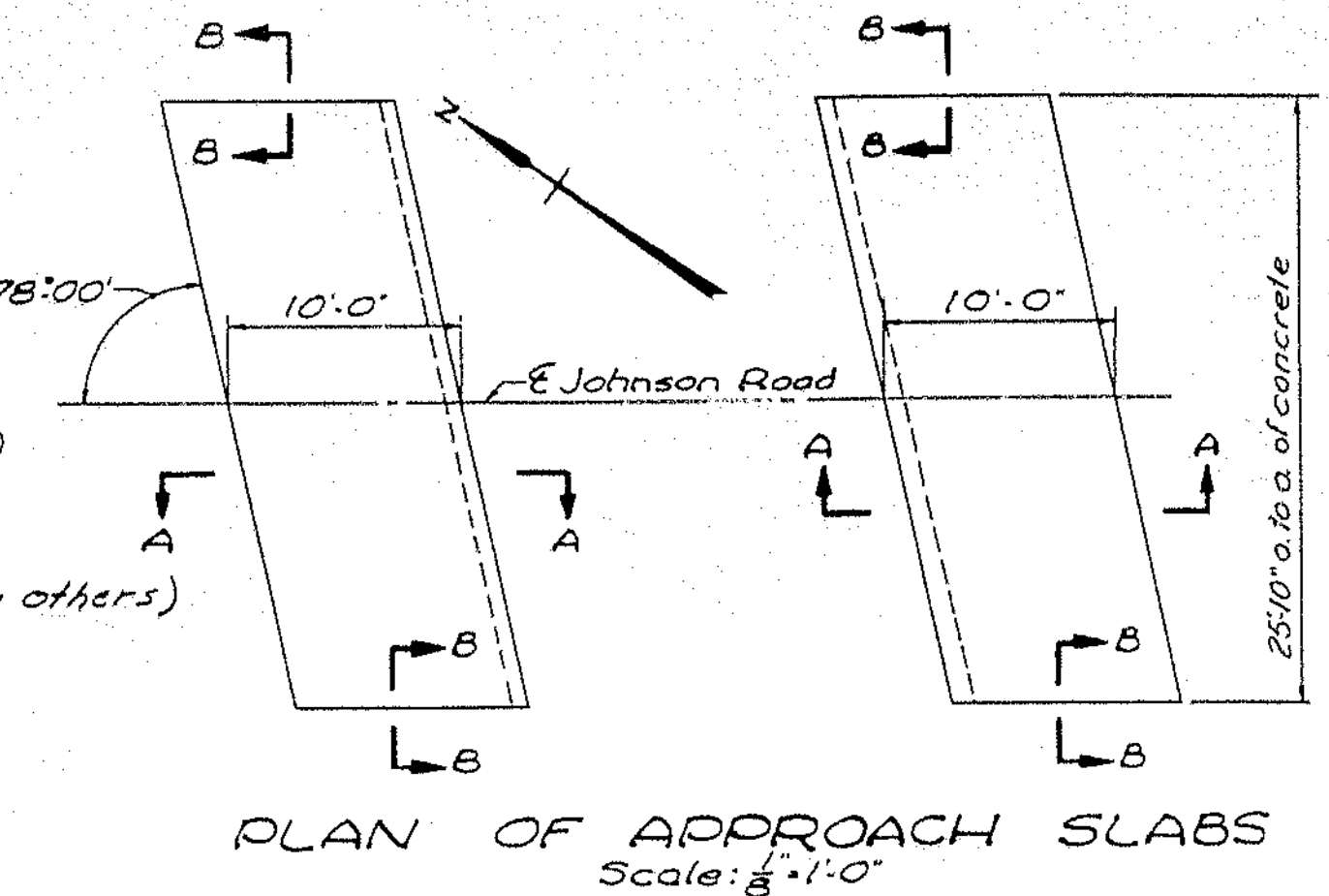
TYPICAL CROSS SECTION OF DECK
Scale: 3/8" = 1'-0"



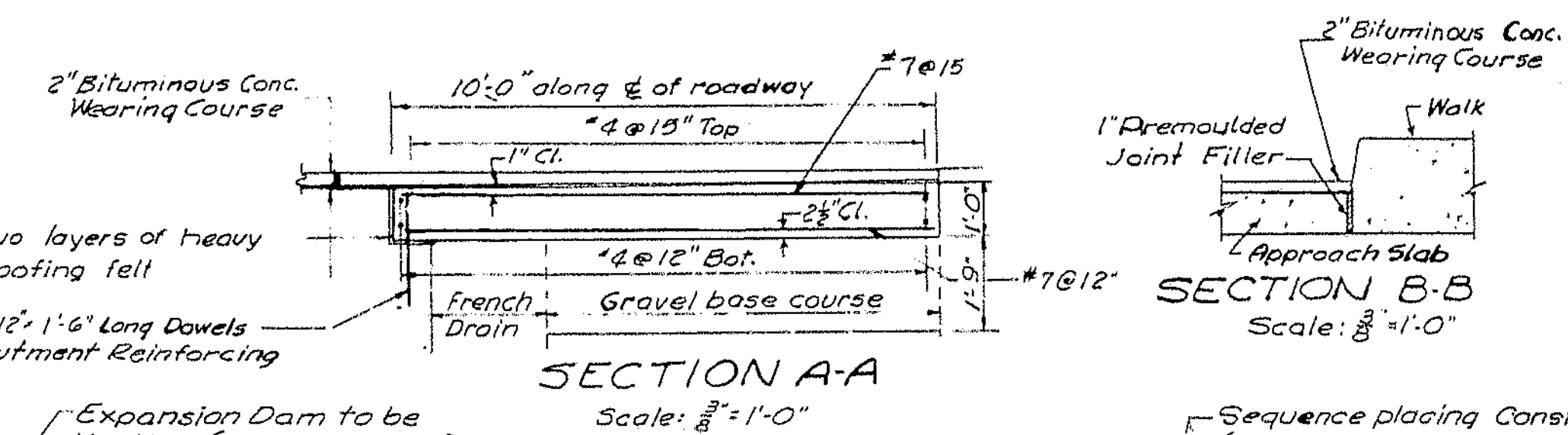
SEQUENCE PLACING JOINT
LONGITUDINAL SECTIONS
Scale: 3/8" = 1'-0"



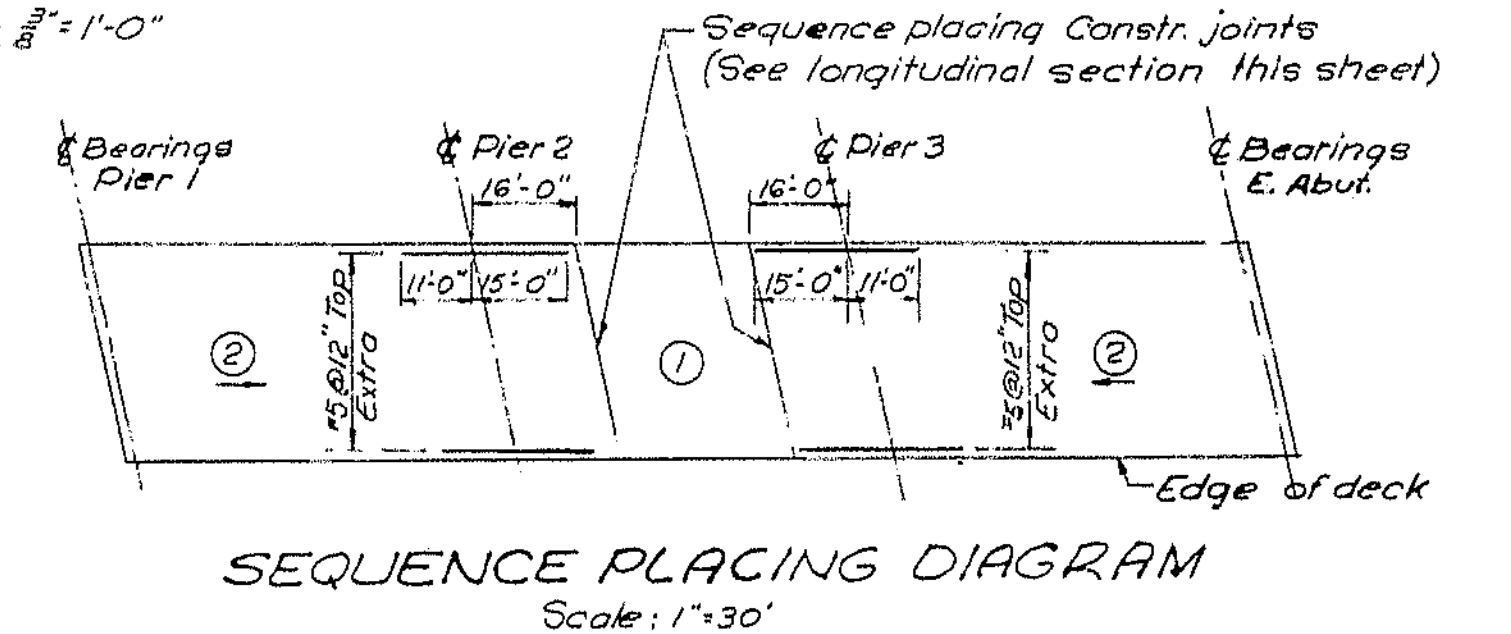
PART PLAN OF DECK
Scale: 3/8" = 1'-0"



PLAN OF APPROACH SLABS
Scale: 3/8" = 1'-0"

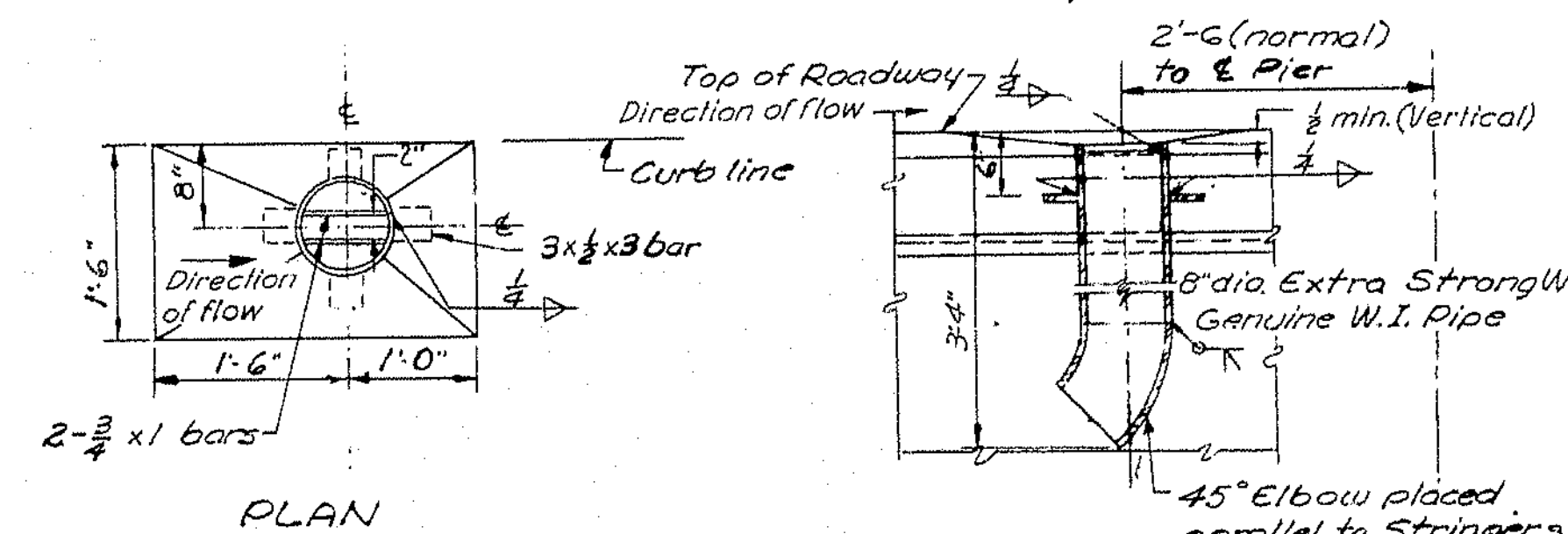


SECTION A-A
Scale: 3/8" = 1'-0"



SEQUENCE PLACING DIAGRAM
Scale: 1" = 30'

Notes for Placing:
Slabs designated by ① shall be placed before those marked ②. Slabs of the same number may be placed simultaneously or in sequence. Slabs may be placed starting from either end unless the direction of placing concrete is shown with an arrow. Once the placing of a slab has been started, it shall be completed without interruption.
Note for Screeds:
After structural steel has been erected, levels are to be run on top flanges of stringers. Screeds for slab are to be set on the basis of these levels corrected for 3/8" of the dead load deflection shown on Sheet No. 13. Changes in screed elevations will not be allowed in the continuous spans after any portion of the deck slab has been placed in those spans.



SCUPPER DETAILS

Details for west side of Bridge shown.
Details for east side of Bridge opp hand.

Notes: For location of scuppers, see Sheet No. 10.
For construction notes see Sheet No. 12.

AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION
AUGUSTA, MAINE

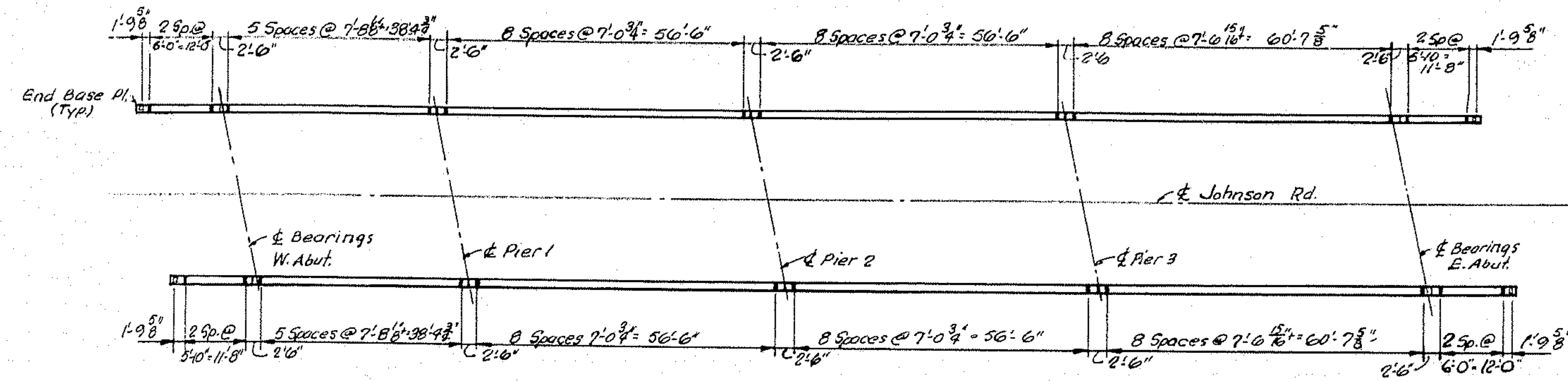
PORTLAND-YARMOUTH INTERSTATE
JOHNSON ROAD OVER INTERSTATE

CROSS SECTION AND DETAILS

SHEET NO. 14 OF 24 SCALE: AS NOTED

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS.

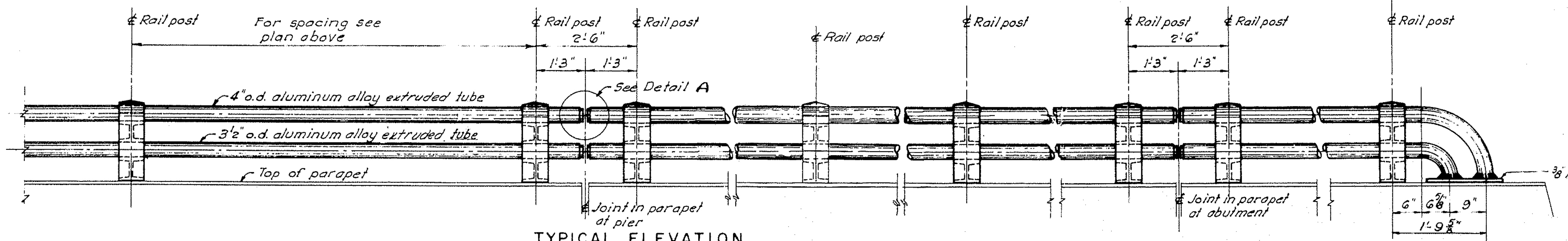
9m-14
2.5



PLAN OF RAILING

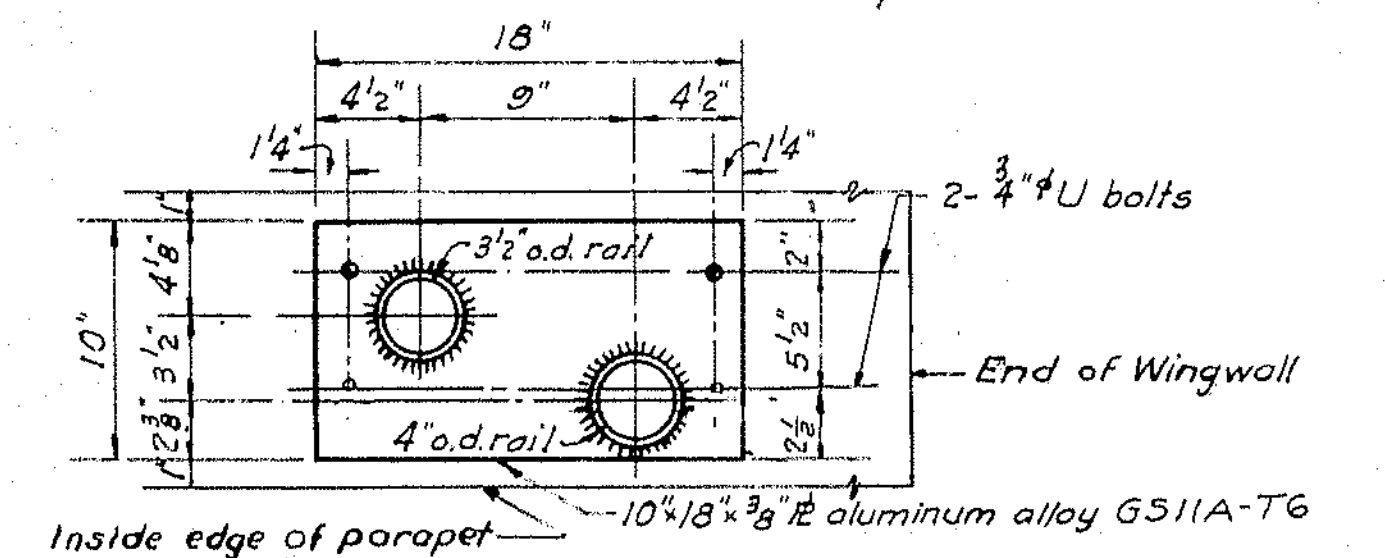
Scale: 1"=20'

All dimensions are horizontal.



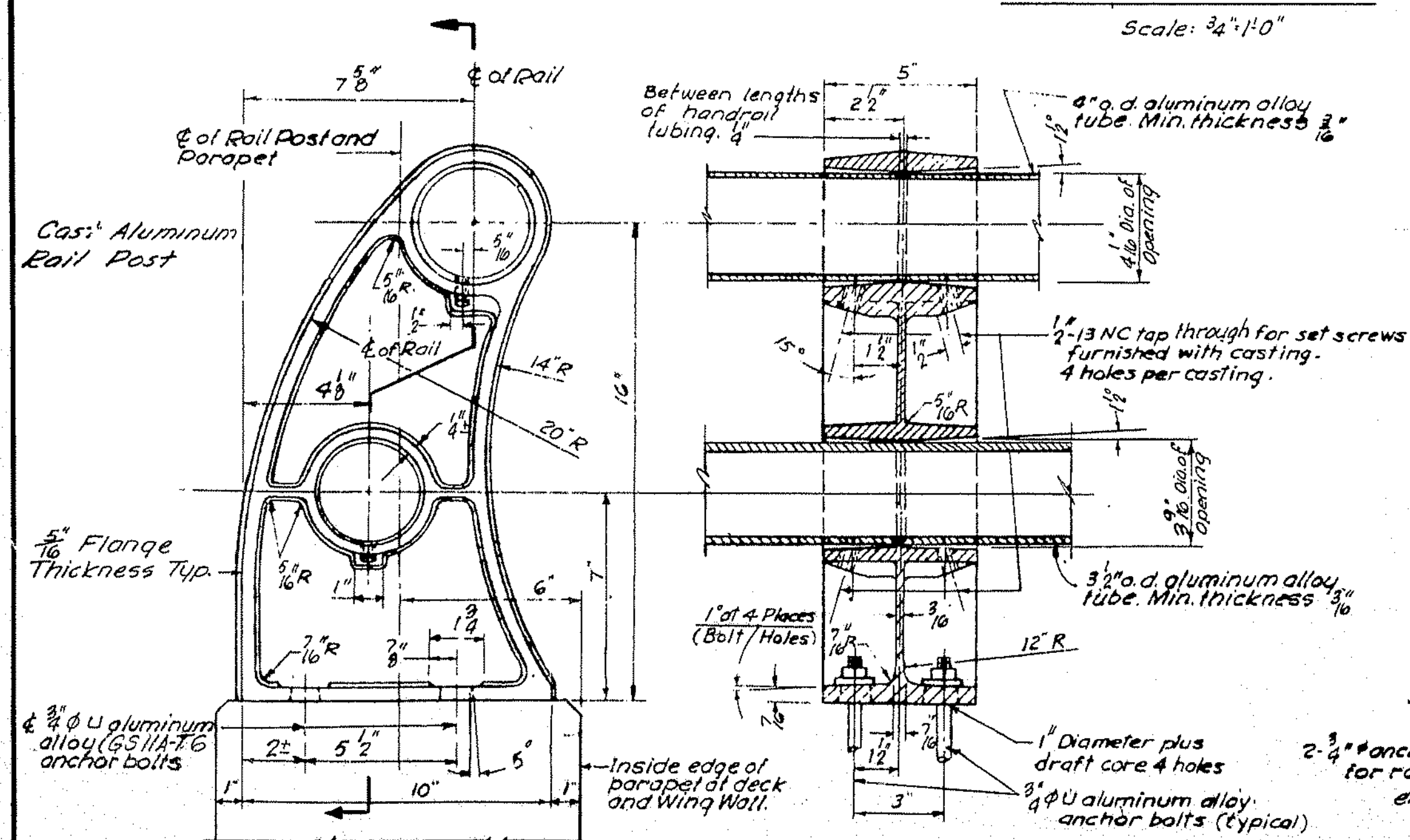
TYPICAL ELEVATION

Scale: 3/4"=1'-0"



DETAIL OF END BASE PLATE

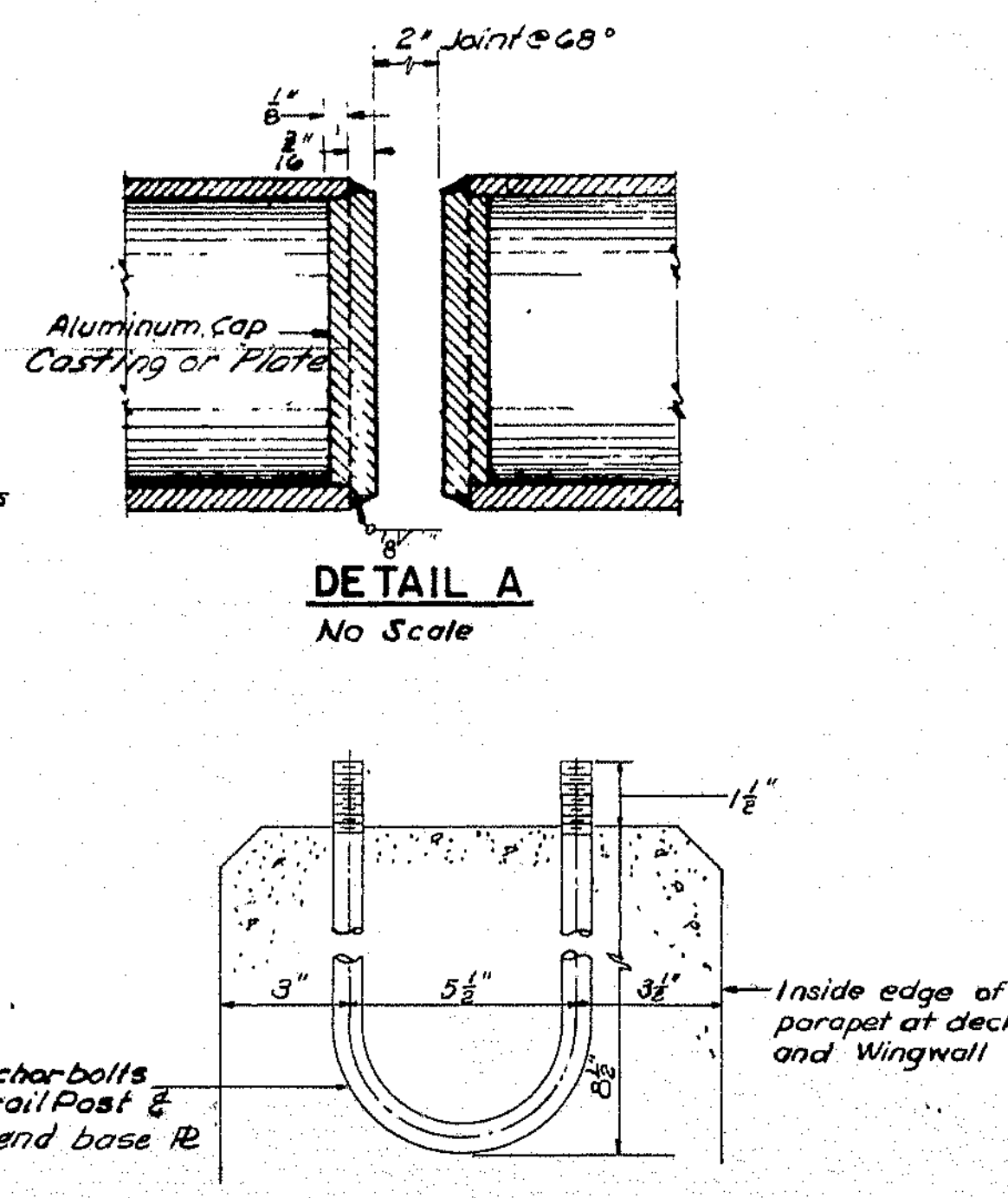
Scale: 1/2"=1'-0"



RAIL POST DETAIL

Scale: 3/4"=1'-0"

- NOTES:
1. The bottom of each railing post shall be thoroughly coated with an aluminum impregnated caulking compound before installation.
 2. Railing post to be set normal to parapet.



DETAIL A

No Scale

DETAIL OF U BOLT FOR RAIL POST

Scale: 3"=1'-0"

AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION
AUGUSTA, MAINE

PORTLAND-YARMOUTH INTERSTATE

JOHNSON ROAD OVER INTERSTATE

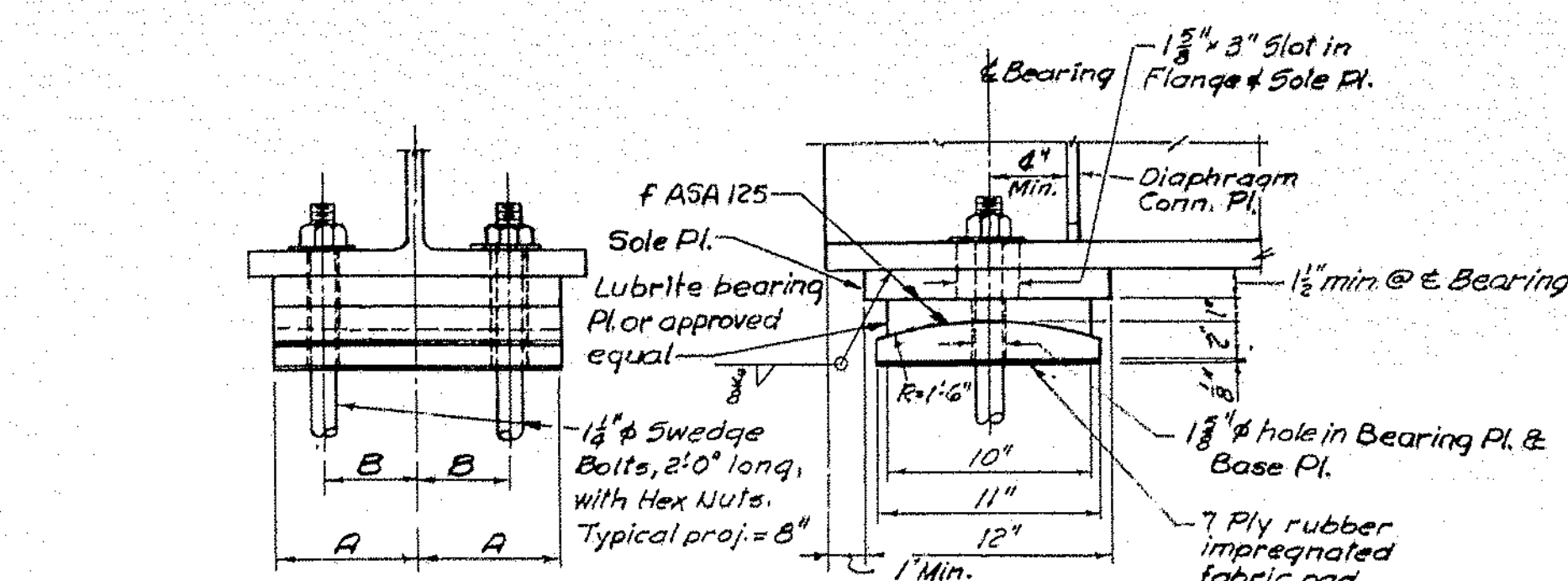
RAILING DETAILS

SHEET NO. 15 OF 24 SCALE: AS NOTED

PAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS.

0m-14

75-195

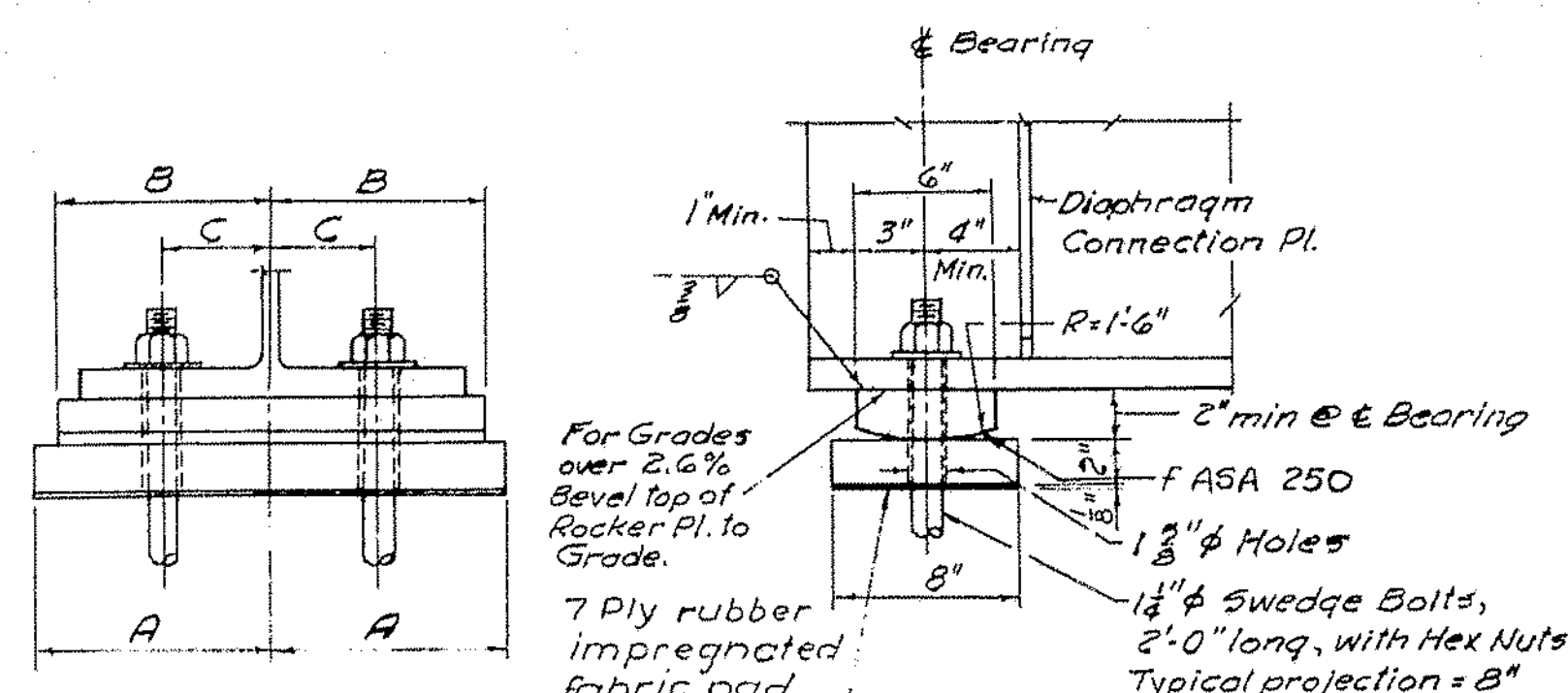


Note: For Grades over 2.6%, Bevel top of Sole Plate to Grade

TYPE A
(EXPANSION BEARING)
Scale: 1 1/2" = 1'-0"

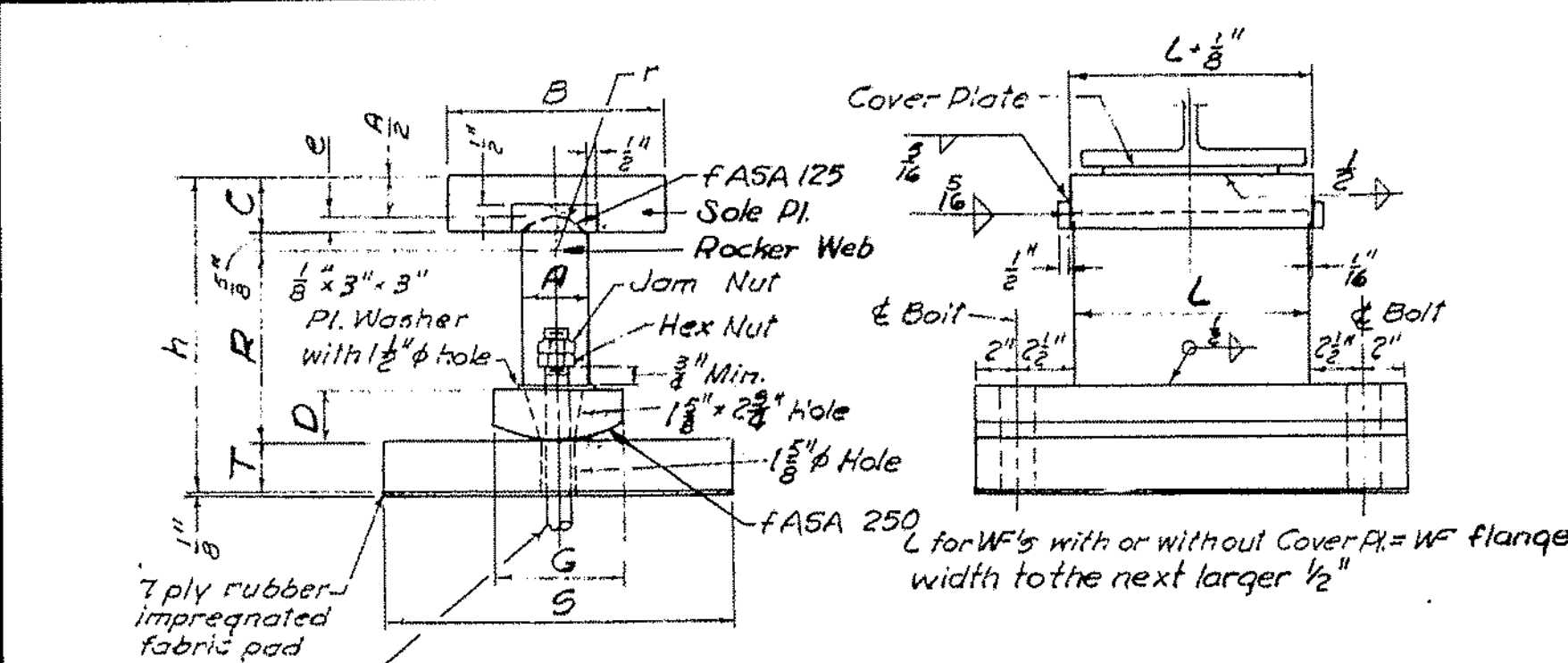
Note for Type "A" and "B" Bearings
All nuts to be drawn up finger tight, then backed off one turn and the threads of the bolts buried off the face of the nuts with a pointed tool.

TYPE A (EXPANSION)		
FLANGE WIDTH	A	B
16 1/2"	7"	4 1/2"
12"	5"	2 3/4"
11 1/2"	5"	2 3/4"
10 1/2"	4 1/2"	2 3/4"
10"	4 1/2"	2 3/4"
9"	4"	2 3/4"

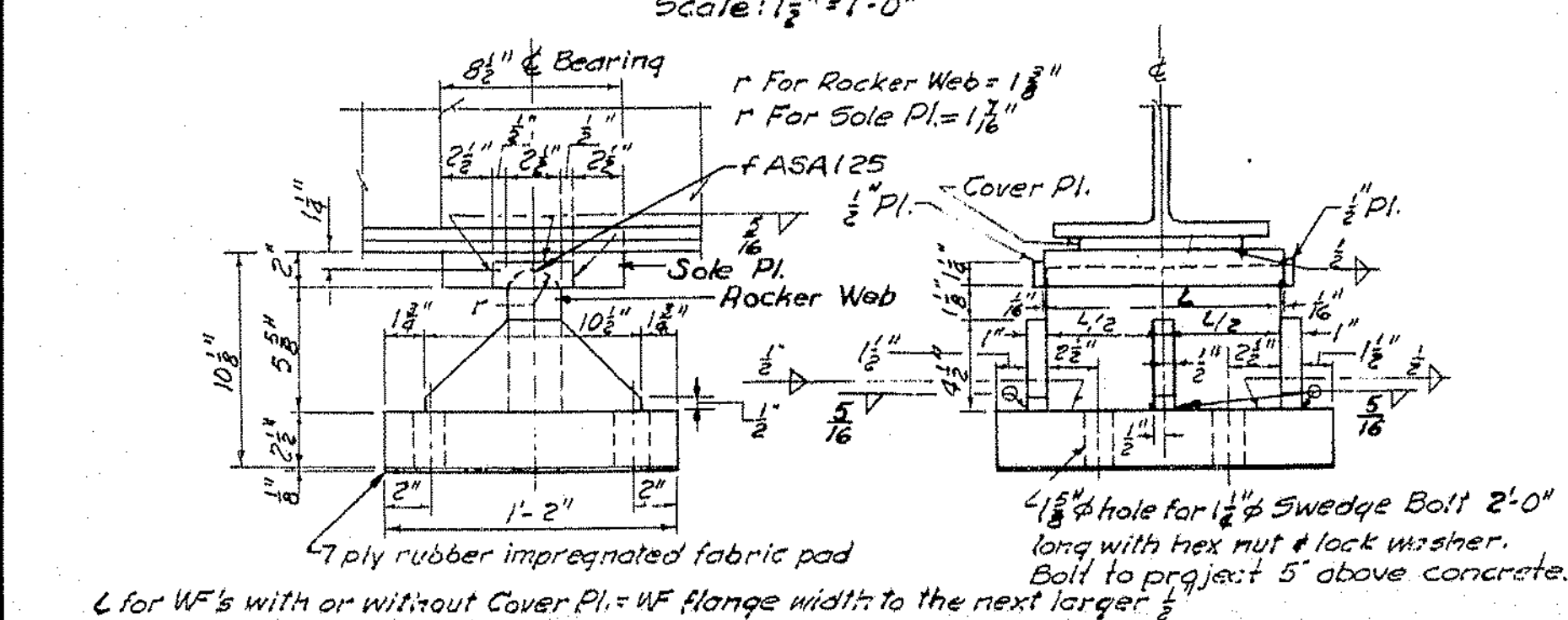


TYPE B
(FIXED BEARING)
Scale: 1 1/2" = 1'-0"

TYPE B (FIXED)			
FLANGE WIDTH	A	B	C
16½"	10"	9"	4½"
12"	8"	7"	2¾"
11½"	8"	7"	2¾"
10½"	7"	6"	2¾"
10"	7"	6"	2¾"
9"	7"	6"	2¾"



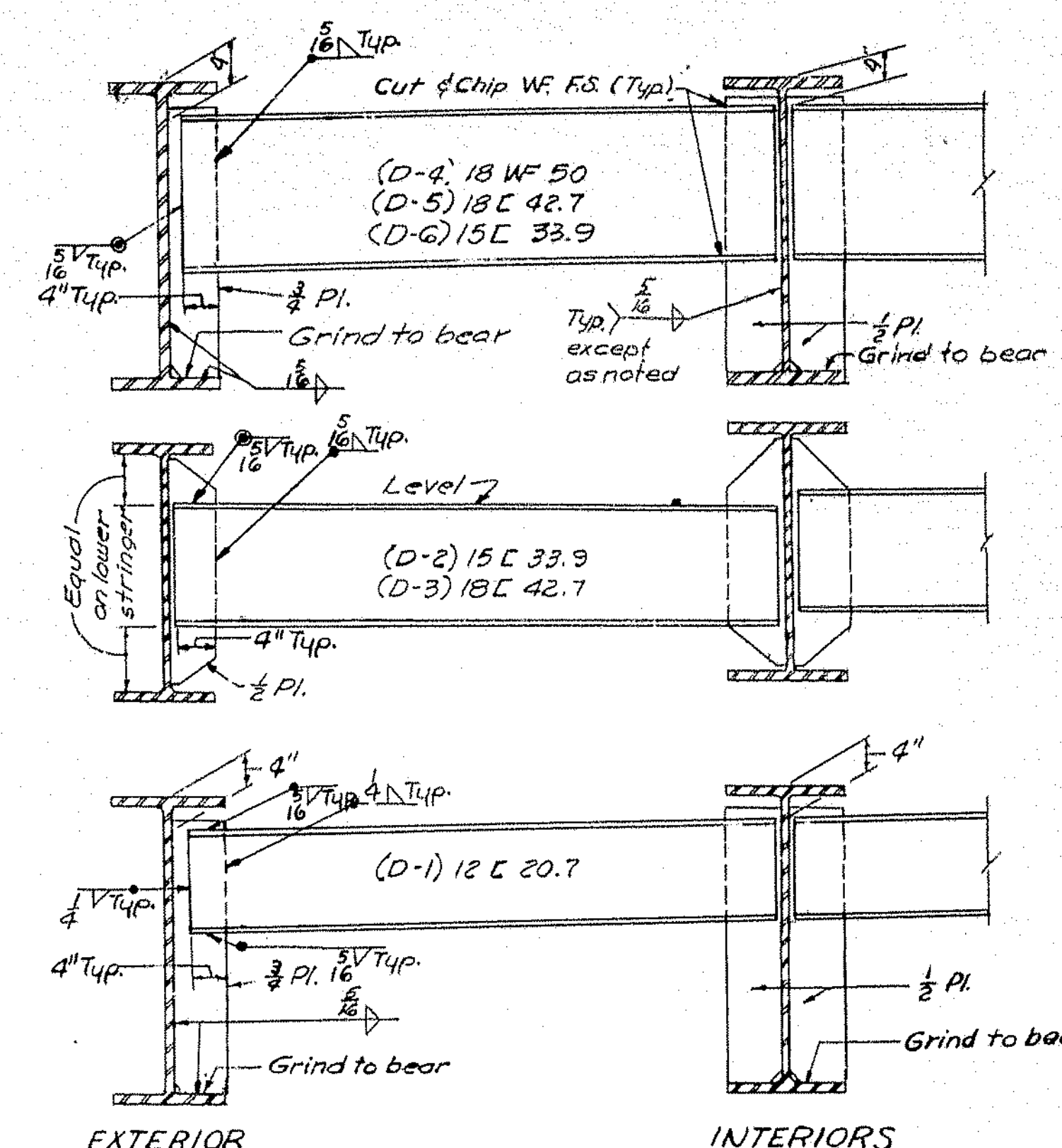
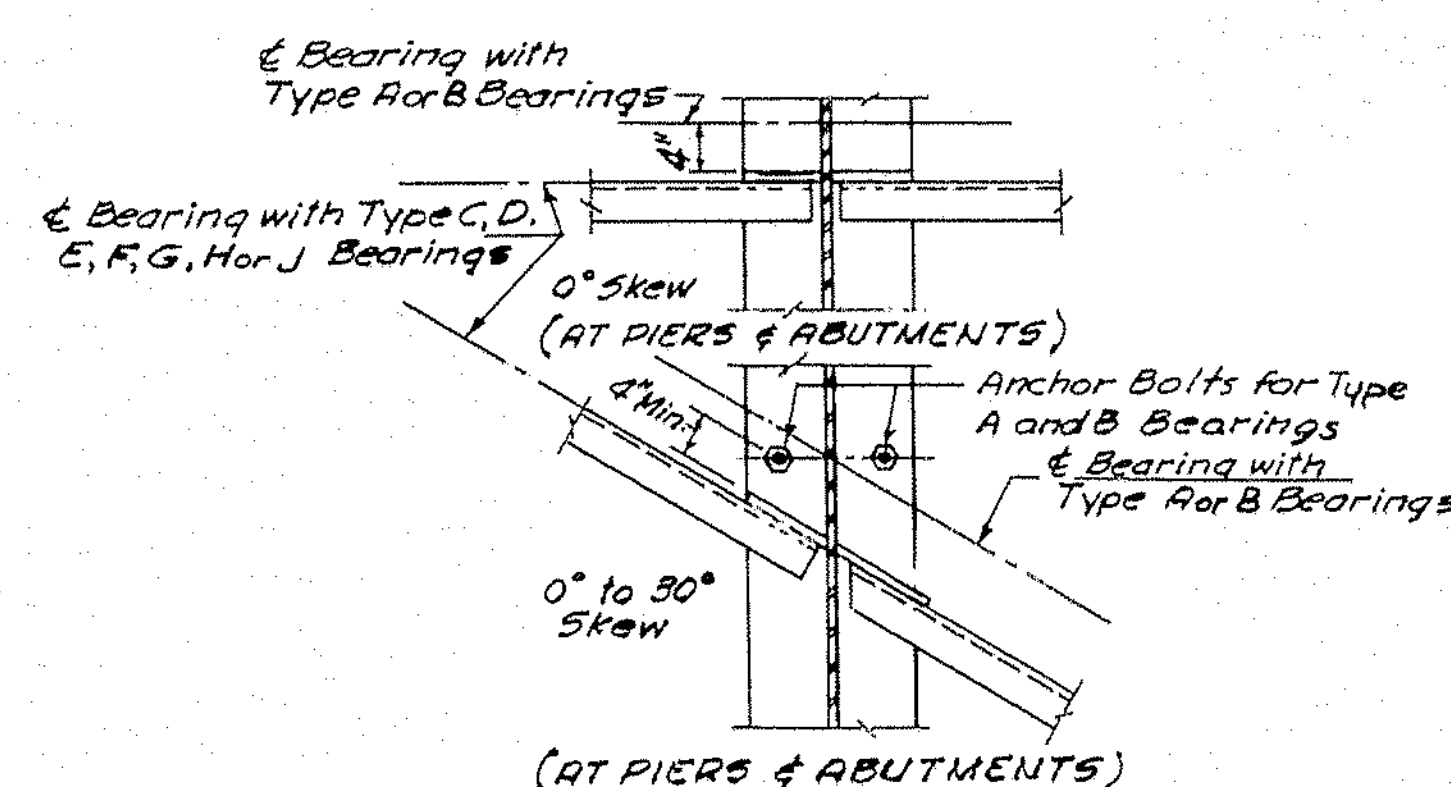
TYPE C, D, E, F, G, H
(EXPANSION BEARINGS)
Scale: 1 1/2" = 1'-0"



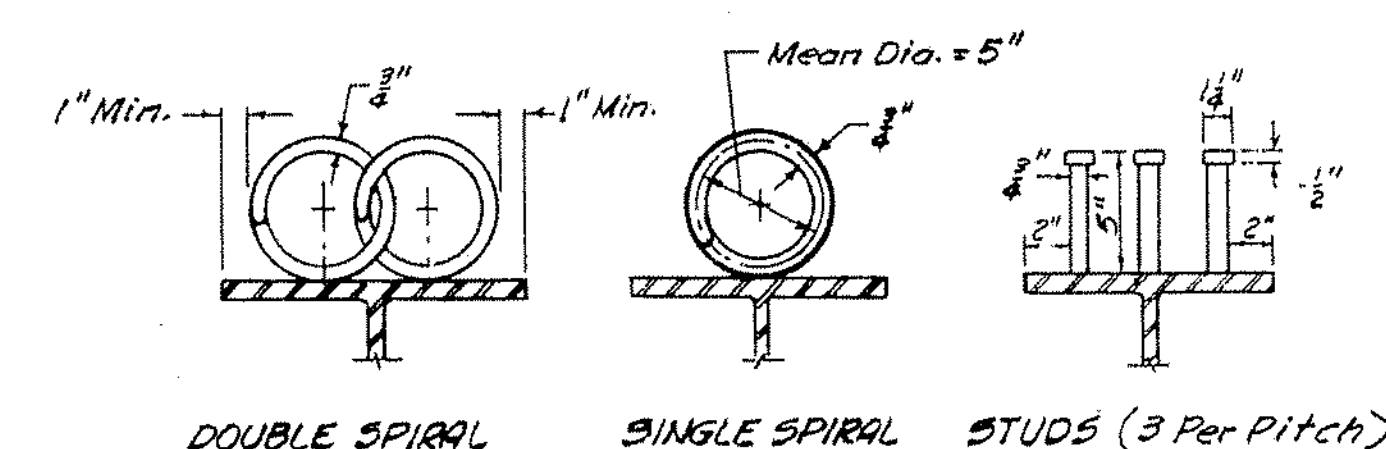
TYPE J
(FIXED BEARING)
Scale: 1 1/2" = 1'-0"

DIMENSIONS										
BEARING TYPE	A	B	C	D	E	G	H	R	S	T
C	2 1/2"	8 1/2"	2"	2 1/2"	2"	6"	10 1/2"	6"	12"	1 1/2"
D	2 1/2"	8 1/2"	2"	2 1/2"	2"	6"	11 1/2"	7"	14"	1 1/2"
E	3"	10"	2 1/2"	2 1/2"	1"	6"	12 1/2"	8"	14"	2"
F	3"	10"	2 1/2"	2 1/2"	1"	6"	12 1/2"	9"	16"	2 1/2"
G	3 1/2"	10"	3"	2 1/2"	1 1/4"	7"	16 1/2"	10"	16"	2 1/2"
H	3 1/2"	10"	3"	2 1/2"	1 1/4"	7"	17 1/2"	11"	18"	2 1/2"

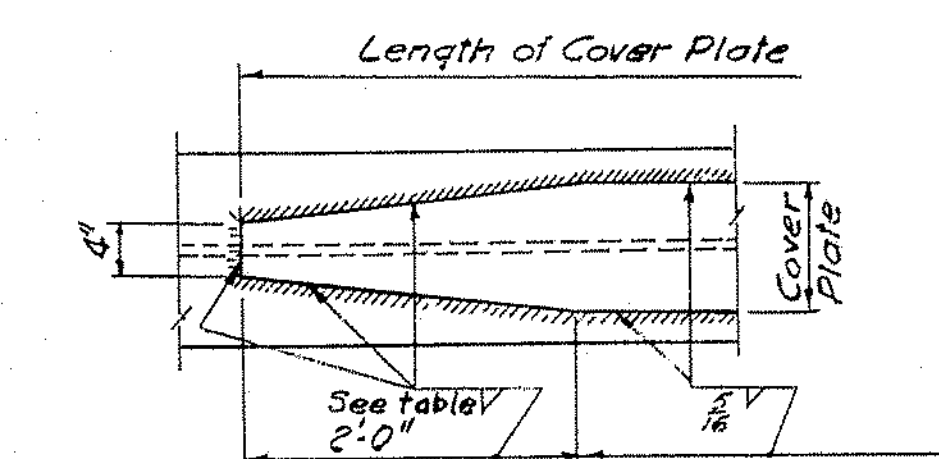
r for Sole Plate = 9/16" + 3/16"
r for Rocker Web = 9/16" + 3/16"



TYPICAL DIAPHRAGM DETAILS
Scale: 3/4" = 1'-0"



SHEAR CONNECTOR DETAILS
Scale: 1 1/2" = 1'-0"



TYPICAL COVER PLATE DETAIL
No Scale

Plate Thickness	Fillet Weld
3/8" to 3/4"	5/16"
1/2" to 1"	7/16"
1 1/8" to 1 1/2"	1"

- Spiral Notes
- All spirals to be fabricated with 3/4" plain bars and to have a mean diameter of 5 inches.
 - Spirals to be welded to stringer flange with two 5/16" fillet welds, 2 1/2" long at each point of contact.
 - Spiral lengths given on framing plan are net lengths and do not include any allowance for laps.
 - Where spiral sections are joined, they shall be lapped for a distance of one-half the smaller pitch.

AS BUILT - NO REVISION

STATE HIGHWAY COMMISSION
AUGUSTA, MAINE

PORTLAND-YARMOUTH INTERSTATE

JOHNSON ROAD OVER INTERSTATE

STANDARD FRAMING DETAILS

SHEET NO. 16 OF 24 SCALE: AS NOTED

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS BOSTON, MASS.

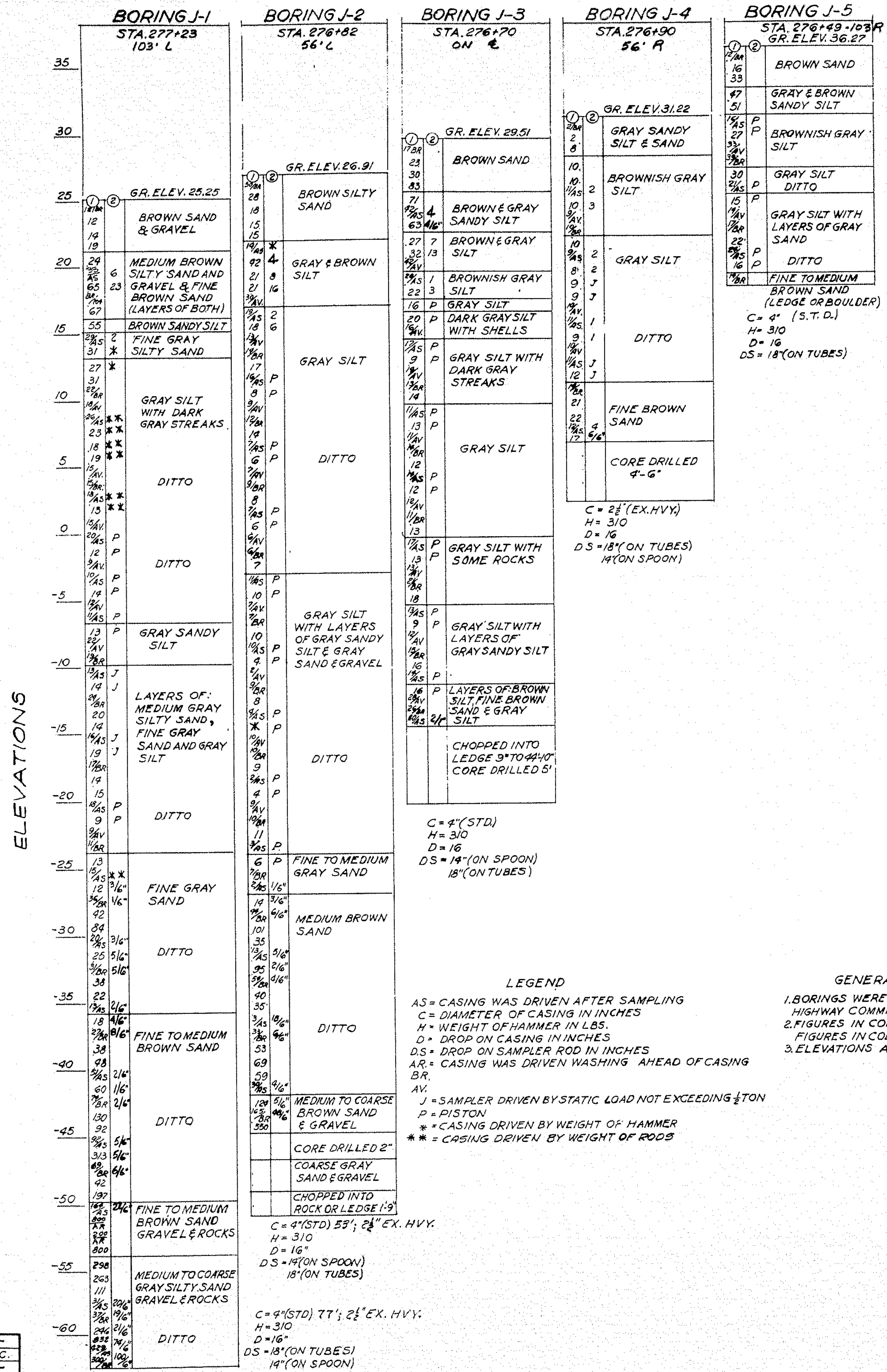
Qm-14

23

75-196

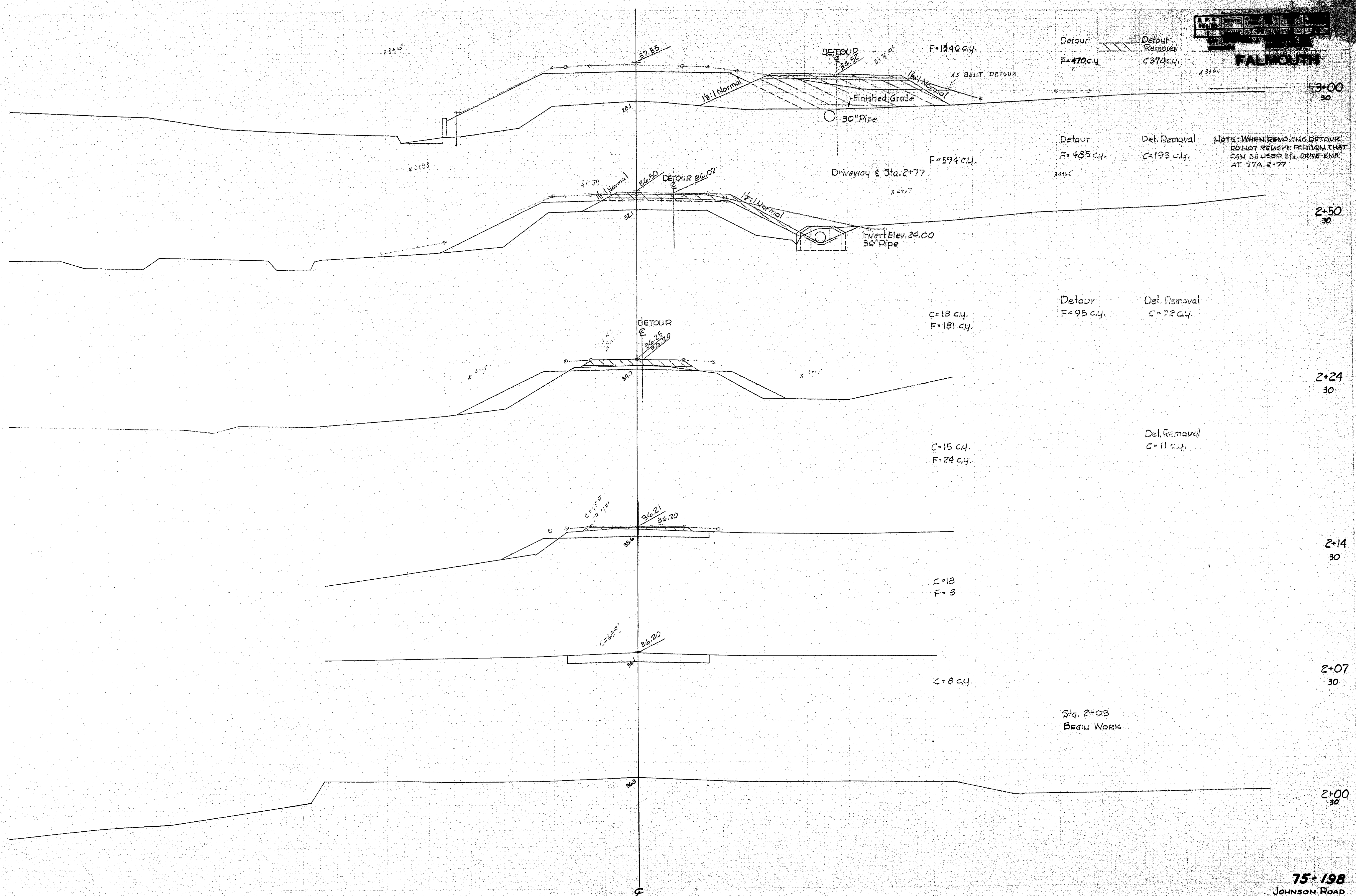
DES. RW, BDZ
DR. RE
TR.
CHK. RK
APPR. HJW

Source: Blue Print 360-4-37

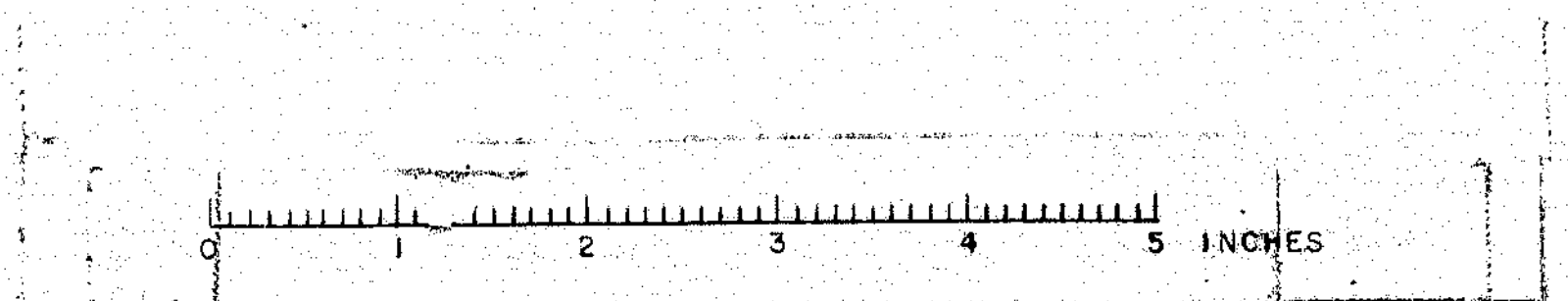




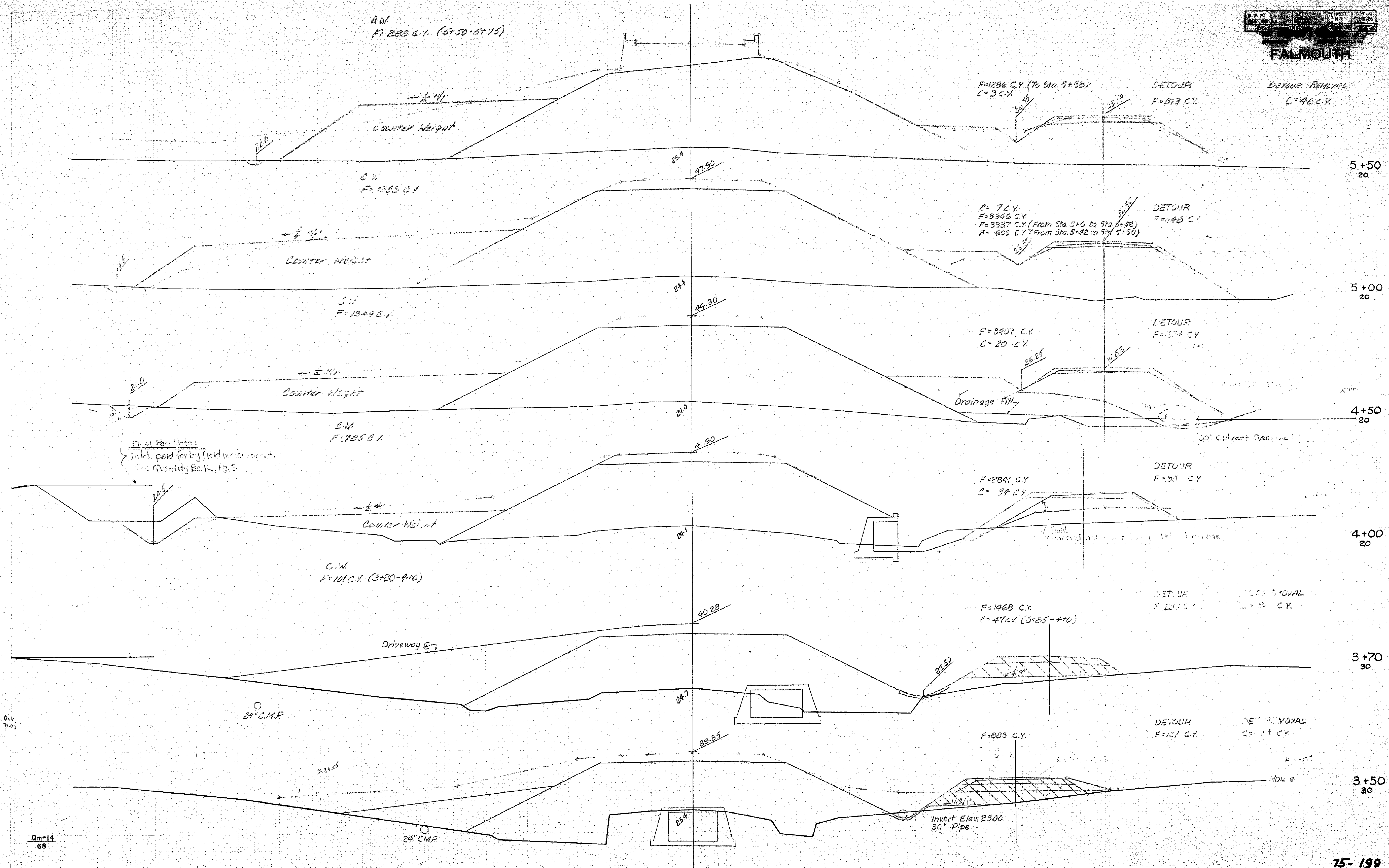
FALMOUTH



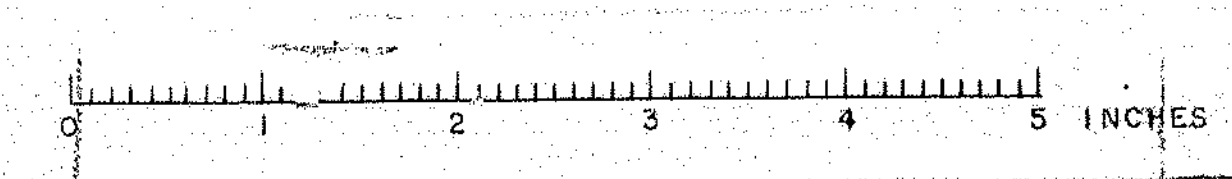
Om-14
67

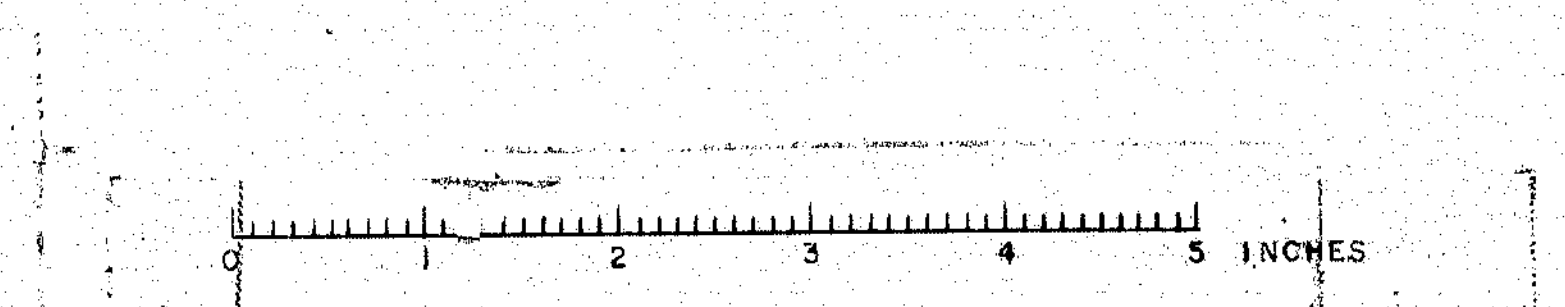
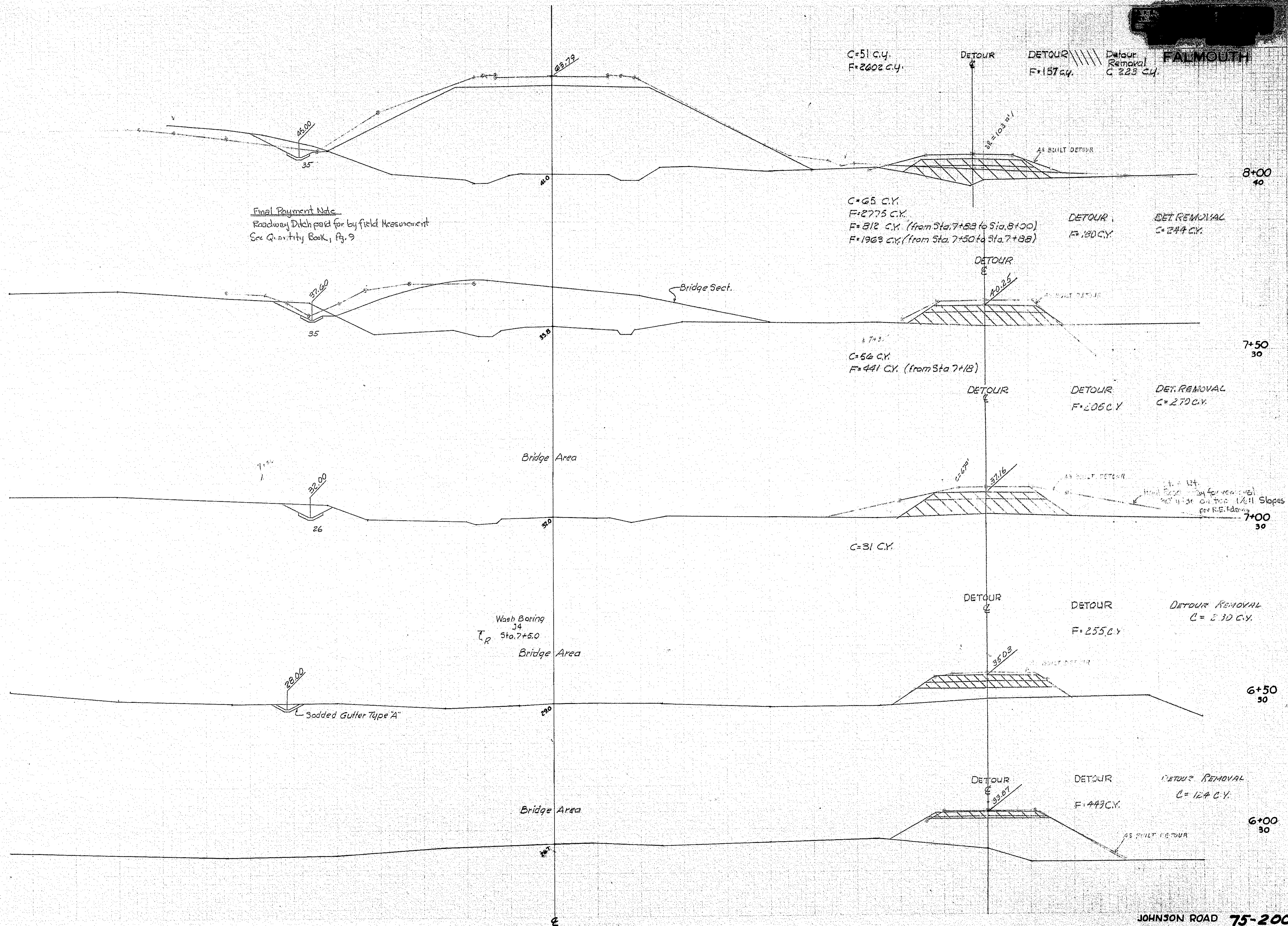


75-198
JOHNSON ROAD



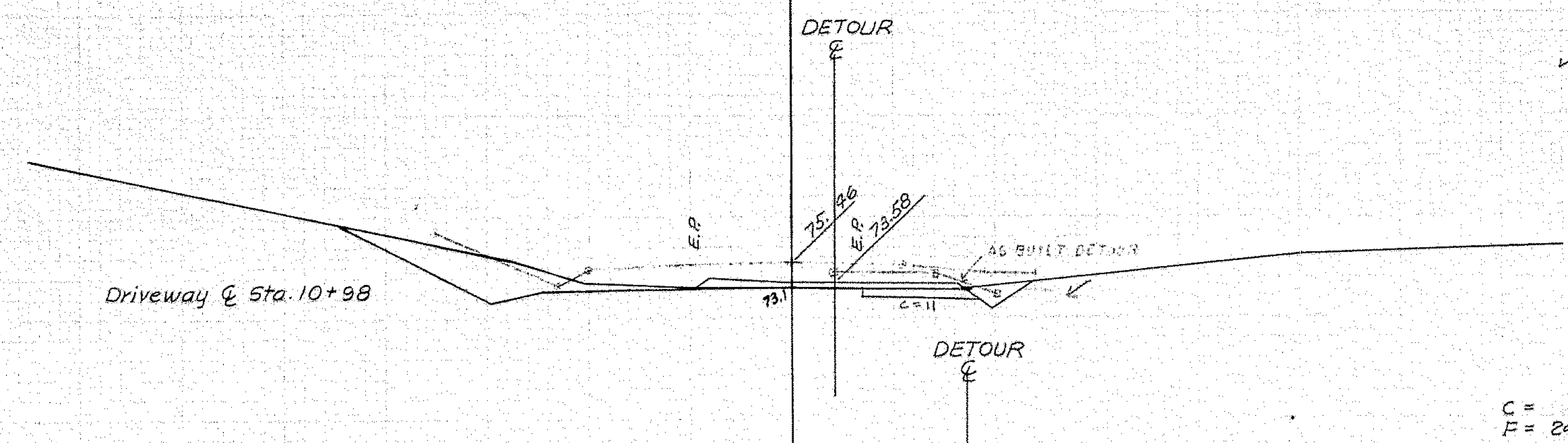
Notes:
1. Inlet paid for by field measurement.
2. Quantity Book, 12.5





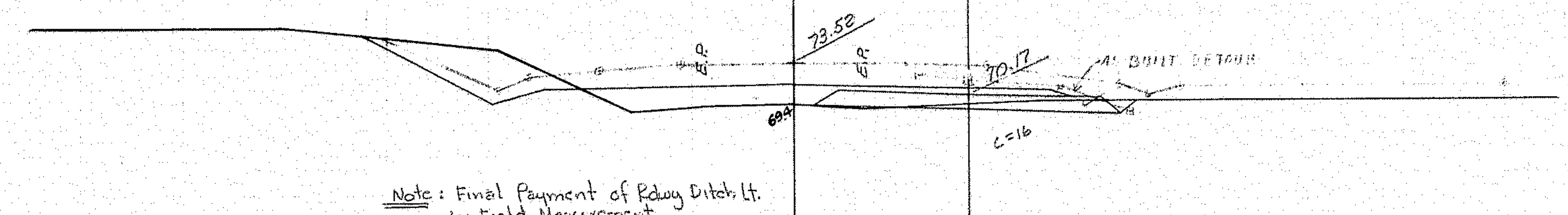


DETOUR
C=17 C.Y.
DETOUR
REMOVAL
F=2 C.Y.



11+00
70

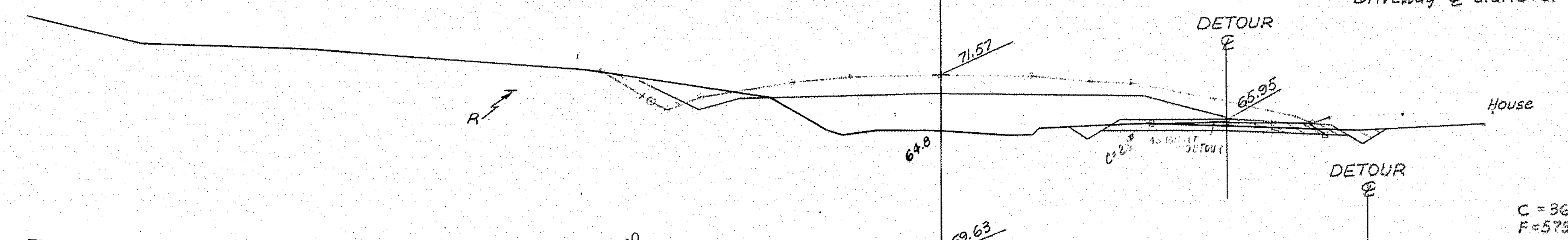
C= 24 C.Y.
DETOUR
C=39 C.Y.
DET.REMOVAL
C= 3
F= 2 C.Y.



10+50
70

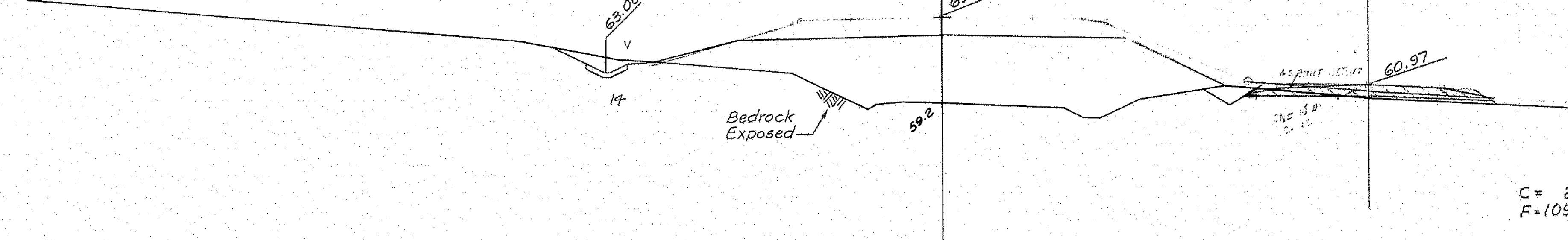
Note: Final Payment of Rdwy Ditch Lt.
by Field Measurement
See Quantity Book, Pg. 3

C= 76 C.Y.
F=263 C.Y.
DETOUR
C=49 C.Y.
DET.REMOVAL
C= 7 C.Y.
F= 5 C.Y.



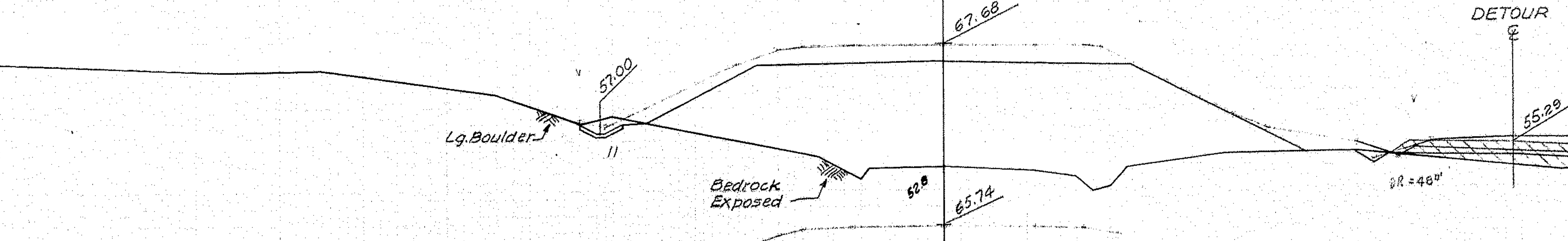
10+00
70

C=36 C.Y.
F=573 C.Y.
DETOUR
C=40 C.Y.
F= 7 C.Y.
DET.REMOVAL
C= 46 C.Y.
F= 5 C.Y.



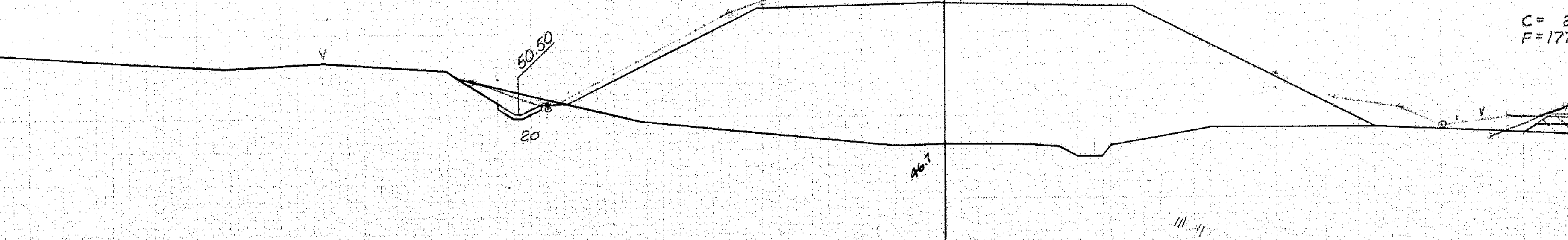
9+50
60

C= 23 C.Y.
F=1096 C.Y.
DETOUR
C= 15 C.Y.
F= 41 C.Y.
DET.REMOVAL
C= 106 C.Y.
F= 2 C.Y.



9+00
60

C= 29 C.Y.
F=1778 C.Y.
DETOUR
C= 2 C.Y.
F= 37 C.Y.
DET.REMOVAL
C= 164 C.Y.
F= 2 C.Y.



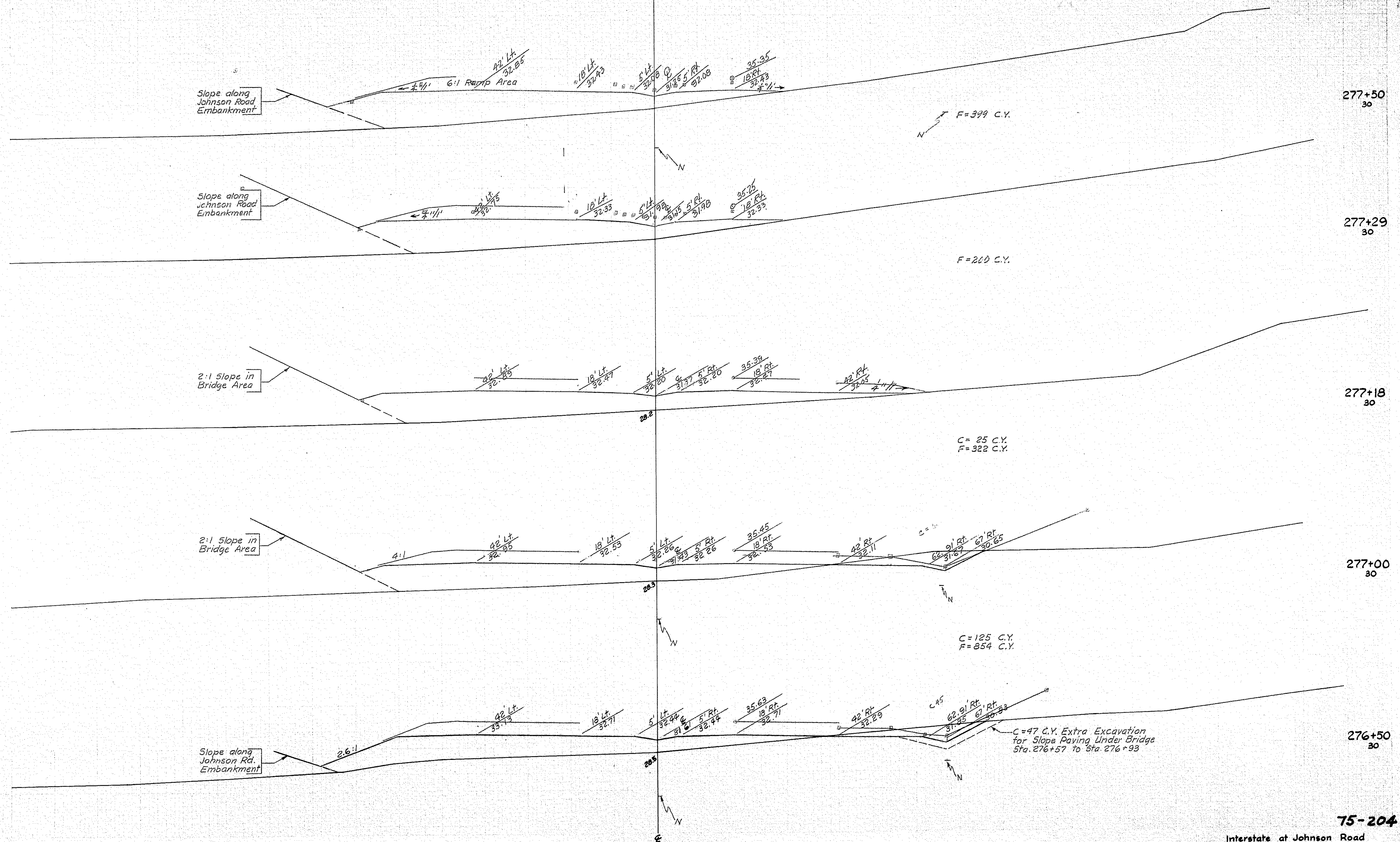
8+50
50

Qm14
70



15-201
JOHNSON ROAD

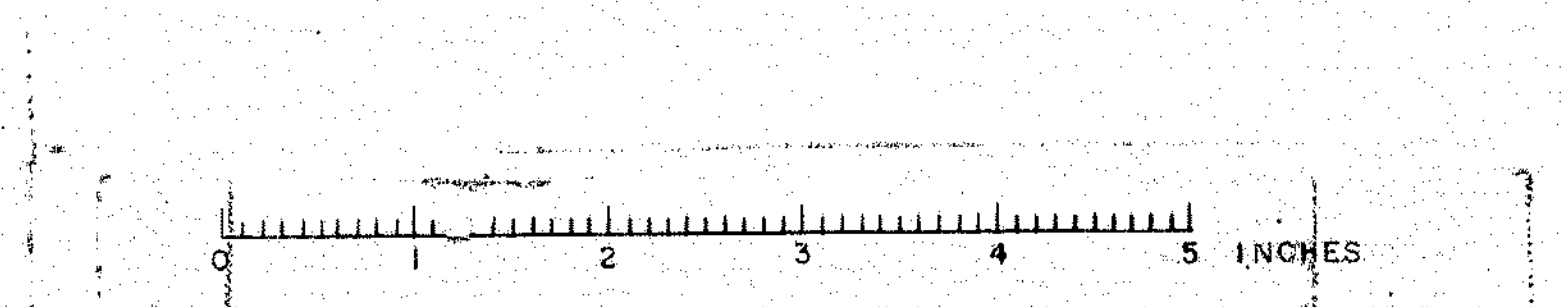
Ramp Fill Down to O.G. at Sta. 278+25
F=579 C.Y. (To Sta. 278+25)



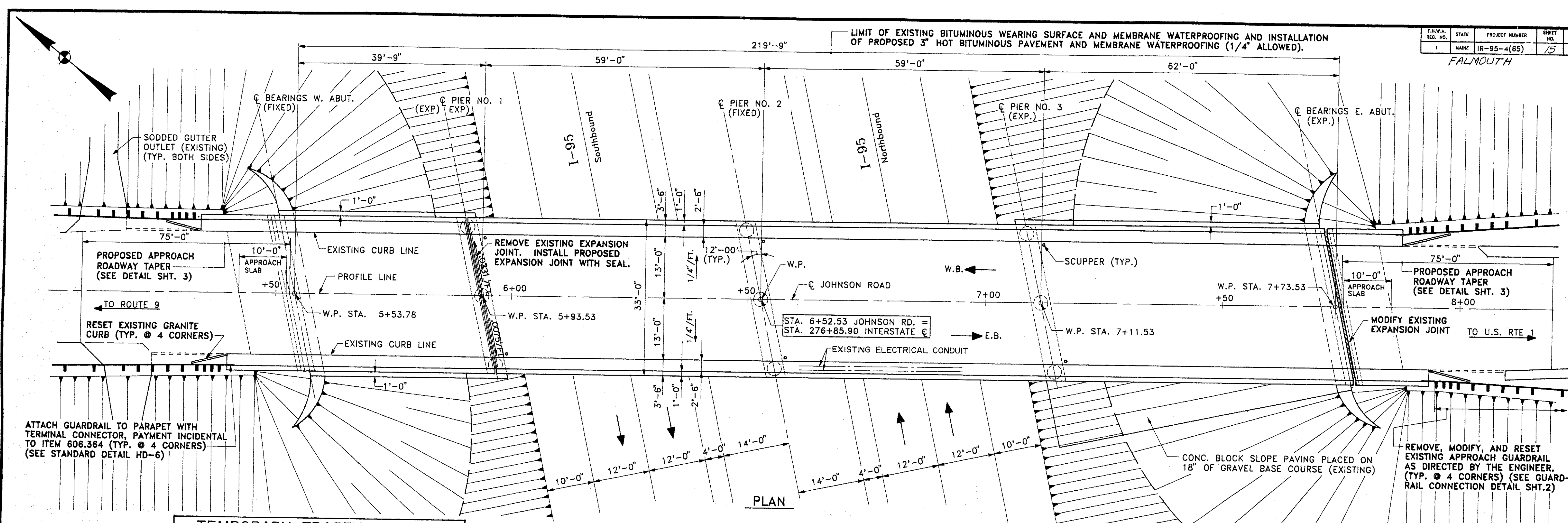
Qm-14
73

75-204

Interstate at Johnson Road



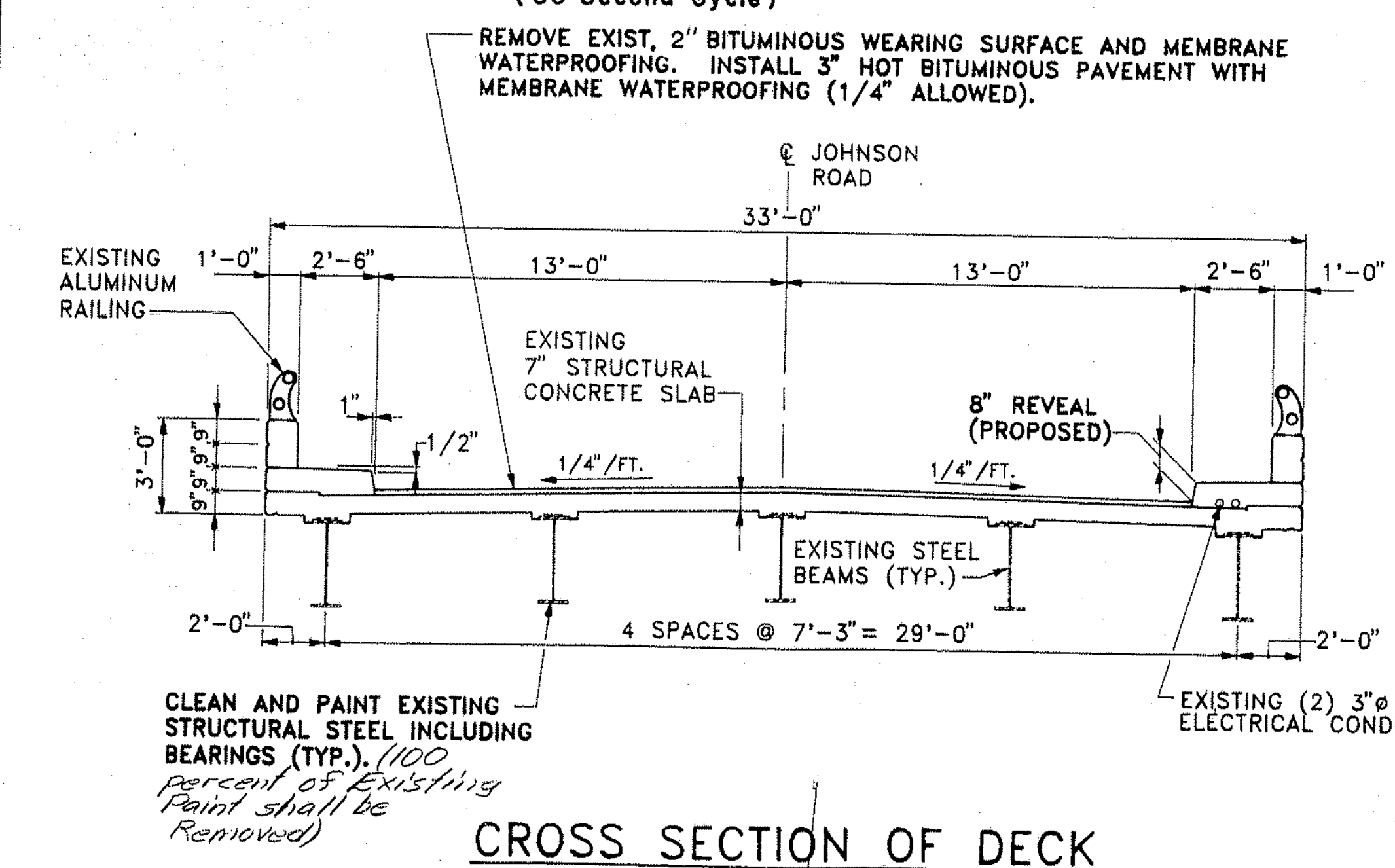
FALMOUTH REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	IR-95-4(65)	15	25



TEMPORARY TRAFFIC SIGNALS							
SIGNAL TIMING	INTERVAL	1	2	3	4	5	6
EAST BOUND	G	Y	R	R	R	R	G
WEST BOUND	R	R	R	G	Y	R	R
TIMING	14	3	13	14	3	13	

(60 Second Cycle)

G = Green
Y = Yellow
R = Red



SCOPE OF WORK

- REMOVE EXISTING BITUMINOUS CONCRETE WEARING SURFACE AND MEMBRANE WATERPROOFING. INSTALL 3" HOT BITUMINOUS PAVEMENT AND MEMBRANE WATERPROOFING (1/4" ALLOWED).
- RESET EXISTING GRANITE CURB AT APPROACHES.
- CLEAN AND PAINT EXISTING STRUCTURAL STEEL INCLUDING BEARINGS.
- REPLACE EXISTING OPEN ARMORED JOINT AT PIER 1 WITH A PROPOSED ARMORED JOINT WITH COMPRESSION SEAL.
- MODIFY EXISTING EXPANSION JOINT AT EAST ABUTMENT.
- REHABILITATE CRACKED, SPALLED OR OTHERWISE DETERIORATED CONCRETE ON SUBSTRUCTURE, CONCRETE SIDEWALK, BRIDGE RAIL PARAPET, AND CONCRETE BRIDGE DECK AS DIRECTED BY THE ENGINEER.
- CONNECT EXISTING APPROACH GUARDRAIL TO EXISTING CONCRETE PARAPET.
- REMOVE, MODIFY, AND RESET EXISTING APPROACH GUARDRAIL AS DIRECTED BY THE ENGINEER.
- MAINTAIN ONE, 11 FOOT MINIMUM TRAFFIC LANE WITH TEMPORARY TRAFFIC LIGHTS DURING CONSTRUCTION.
- REHABILITATE 75'-0" APPROACH ROADWAY AT BOTH ENDS OF BRIDGE, OVERLAY AND SHIM TO MATCH PROPOSED PAVEMENT ELEVATION ON BRIDGE.

UTILITIES

* REPLACE WEST APPROACH SLAB.
CENTRAL MAINE POWER

SPECIFICATION

DESIGN: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 1989.
CONTRACT: STATE OF MAINE, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS, HIGHWAYS AND BRIDGE, REVISION OF JULY 1988.

TRAFFIC DATA

AADT (1988)	1,070
AADT (2008)	1,710
DESIGN HOURLY VOLUME	188
PERCENT TRUCKS	6
DIRECTIONAL DISTRIBUTION (%)	60
POSTED SPEED (MPH)	40
18 KIP EQUIVALENT P2.5	31

INDEX OF SHEETS

GENERAL PLAN AND CROSS SECTION	1
DETAILS AND ESTIMATE OF QUANTITIES	2
DETAILS	3

BRIDGE STANDARD DETAILS

BD 201-89 CONCRETE END POSTS	
BD 301-89 EXPANSION DEVICE	

DESIGN LOADING

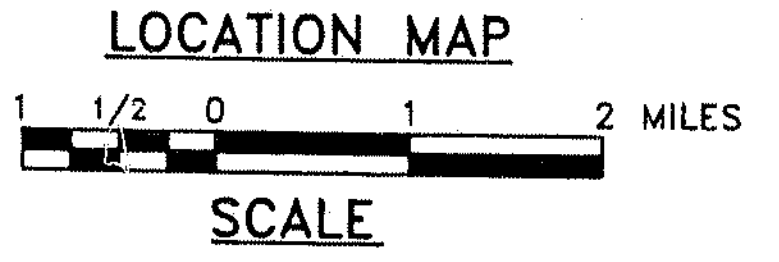
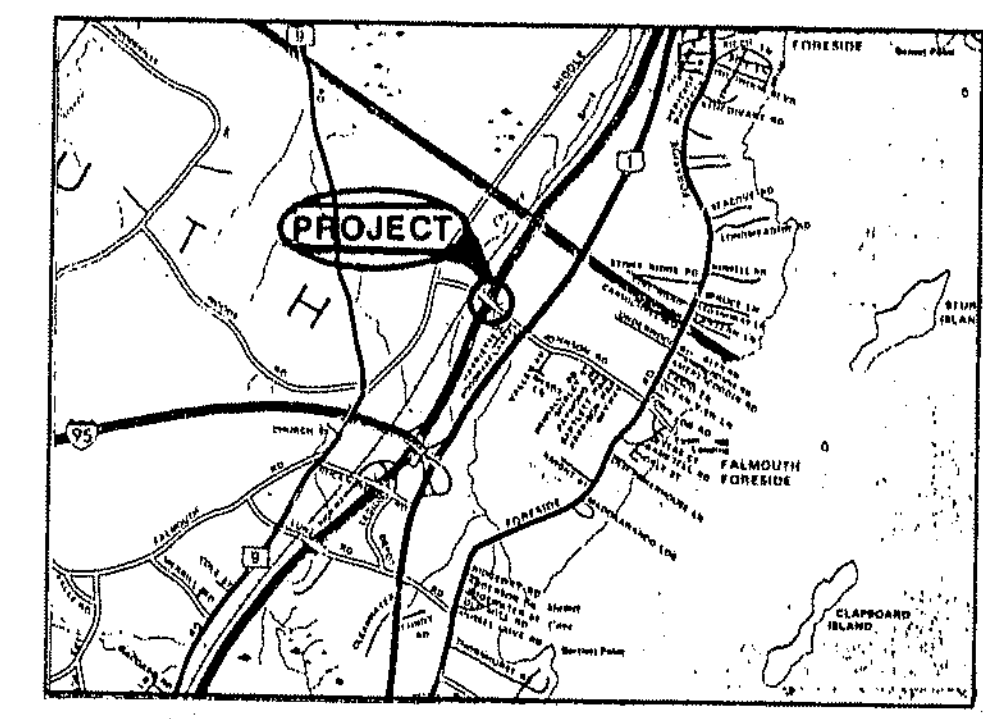
LIVE LOAD: H20-44 (EXISTING)

MATERIALS

REINFORCING STEEL: ASTM A615 GRADE 60
STRUCTURAL STEEL: ASTM A373 (EXISTING)

BASIC ALLOWABLE STRESSES

CONCRETE: $f_c = 1,200$ psi
REINFORCING STEEL: $f_s = 24,000$ psi
STRUCTURAL STEEL: $f_s = 18,000$ psi



109-277

PLANS OF THE EXISTING BRIDGE ARE AVAILABLE FOR THE CONTRACTOR'S REFERENCE AT THE BRIDGE DESIGN OFFICE IN AUGUSTA. THE PLANS ARE REPRODUCTIONS OF ORIGINAL DRAWINGS AS PREPARED FOR THE CONSTRUCTION OF THE BRIDGE AND IT IS VERY UNLIKELY THAT THE PLANS WILL SHOW ANY CONSTRUCTION FIELD CHANGES OR ANY ALTERATIONS WHICH MAY HAVE BEEN MADE TO THE BRIDGE DURING ITS LIFE SPAN.

Revised A. Built
WES 5-10-93

PIN NO. 03280.00
BRIDGE NO. 5792

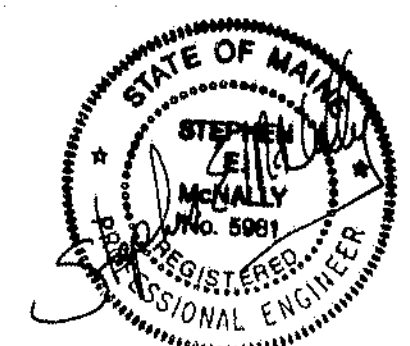
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

Kimball Chase
ONE GATE STREET
PORTSMOUTH, N.H. 03801
(603) 431-2520

JOHNSON ROAD 98
over
I-95
FALMOUTH, MAINE
CUMBERLAND COUNTY

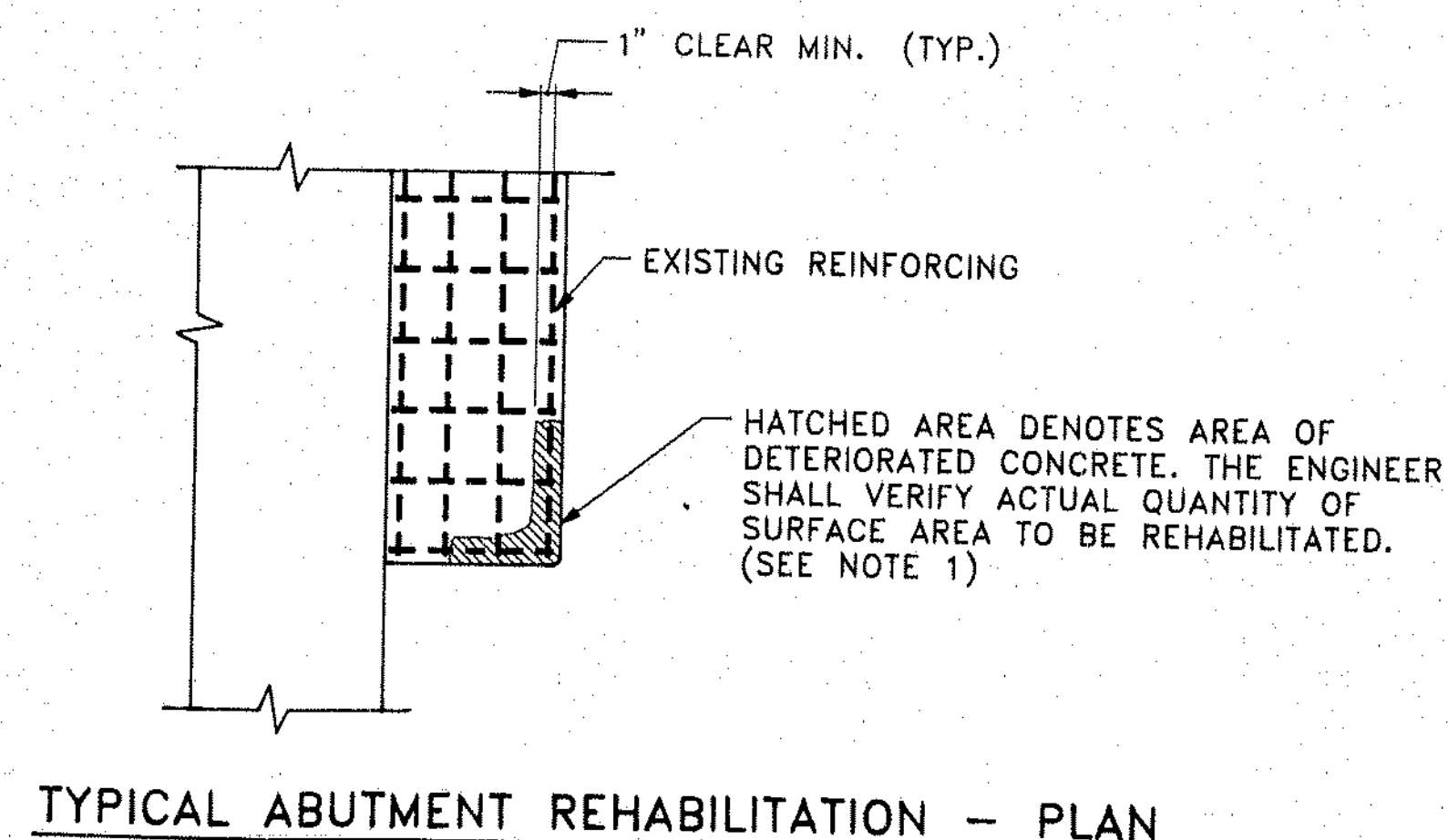
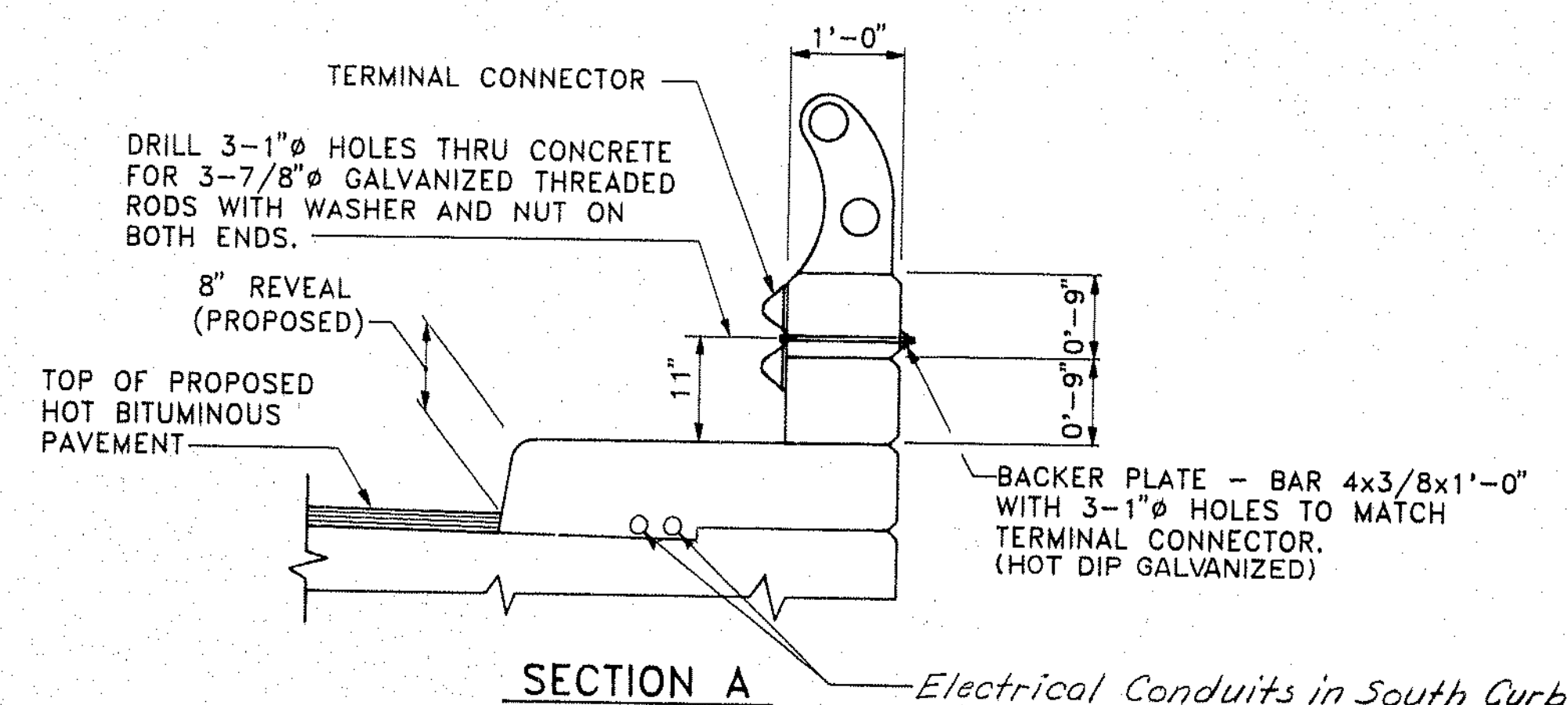
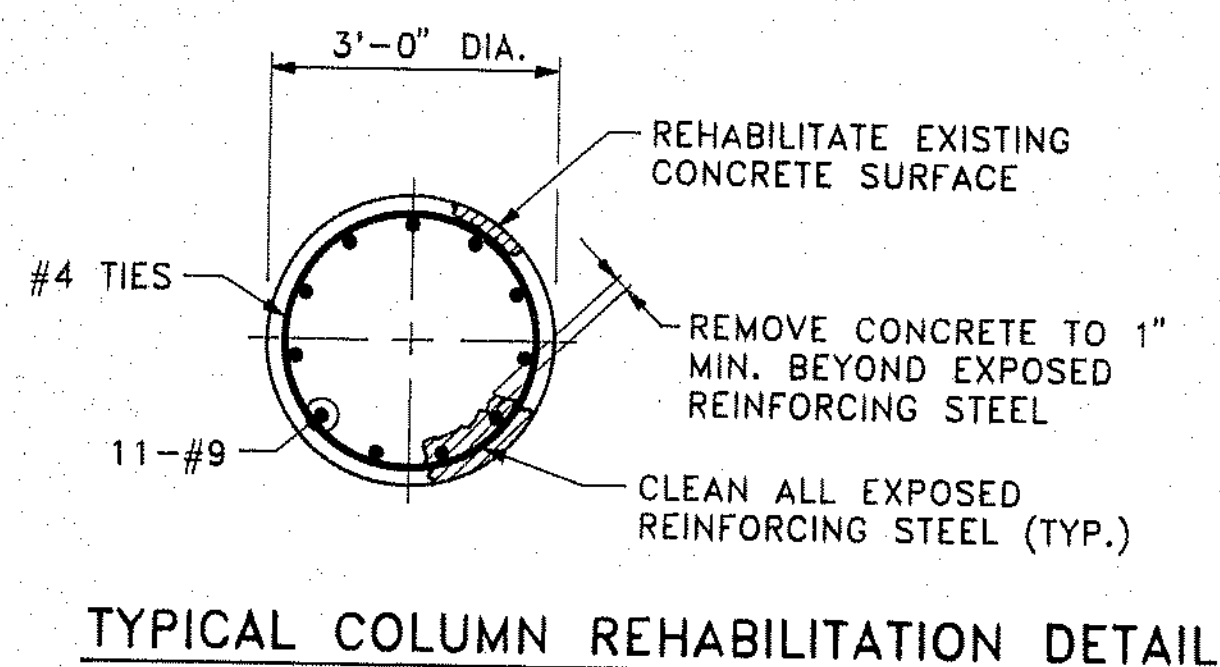
GENERAL PLAN AND CROSS SECTION

SHEET 1 OF 3
AUGUSTA, MAINE





PROJECT DESIGN ENGINEER	DESIGN -	BY	DATE
	DETAILED	J. FELDERMAN	2-5-90
	CHECKED	S. McNALLY	2-20-90
	REVISIONS		
PLANS		FIELD CHANGES	

PROJECT DESIGN ENGINEER	DESIGN -	BY	DATE
	DETAILED	J. FELDERMAN	2-5-90
	CHECKED	S. McNALLY	2-20-90
	REVISIONS		
PLANS		FIELD CHANGES	



1. IF THE DEPTH OF DETERIORATED CONCRETE EXTENDS TO THE REINFORCING BARS, THEN REMOVE CONCRETE TO A MINIMUM DEPTH OF 1" BEYOND THE REINFORCING STEEL.
2. RESETTING EXISTING POSTS AND INSTALLATION OF PROPOSED GUARD RAIL POSTS TO BE INCIDENTAL TO ITEM 606.364.
3. TERMINAL CONNECTOR AND ATTACHMENTS TO THE EXISTING CONCRETE PARAPET TO BE INCIDENTAL TO ITEM NO. 606.364.
4. AFTER THE EXISTING BITUMINOUS PAVEMENT HAS BEEN REMOVED, THE CONTRACTOR MAY BE DIRECTED BY THE ENGINEER TO REHABILITATE AREAS OF THE DECK. PAYMENT WILL BE MADE UNDER ITEMS 518.30 OR 518.31 WHICHEVER IS APPLICABLE.
5. PROPOSED REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2" UNLESS OTHERWISE INDICATED.
6. PROTECTIVE COATING FOR CONCRETE SURFACES SHALL BE APPLIED TO ALL EXPOSED SURFACES OF CONCRETE PATCHING AND THE IMMEDIATE SURROUNDING AREA AS DIRECTED BY THE ENGINEER.

 EXISTING CONCRETE TO BE REMOVED
 PROPOSED CONCRETE

PIN NO. 003280.00
BRIDGE NO. 5792

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

 **Kimball
Chase** ONE CATE STREET
PORTSMOUTH, N.H. 03801
(603) 431-2520

JOHNSON ROAD 99
over

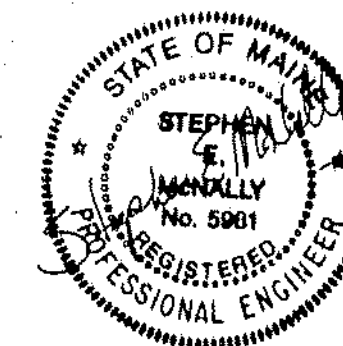
I-95

FALMOUTH, MAINE
CUMBERLAND COUNT

DETAILS & ESTIMATE OF QUANTITIES

SHEET 2 OF 3

AUGUSTA, MAINE



PROPOSED 3" HOT BITUMINOUS PAVEMENT, PLACE PAVEMENT 1/4" HIGHER THAN TOP OF ARMORED JOINT AND CONCRETE WEARING SURFACE. (TYP. BOTH SIDES)

PROPOSED MEMBRANE WATERPROOFING (1/4" ALLOWED) EXTEND MEMBRANE WATERPROOFING 1 1/2" VERTICALLY AT ARMORED JOINT (TYP. BOTH SIDES)

EXISTING REINF. TO REMAIN (*) (TYP. BOTH SIDES)

3 #6 (29'-3" LG) (TYP BOTH SIDES - 6 TOTAL)

2 #6 BETWEEN STRINGERS (TYP BOTH SIDES) (32 TOTAL @ 6'-9" LG)

PROPOSED #4 @ 12" 6' 12" (TYP BOTH SIDES) (70 TOTAL)

CUT EXISTING REINF. BARS (INCIDENTAL TO ITEM 503.13)

SEE BD 301-89 DETAIL C

BRGS

1'-0"

1'-0"

3'-0"

6'-0"

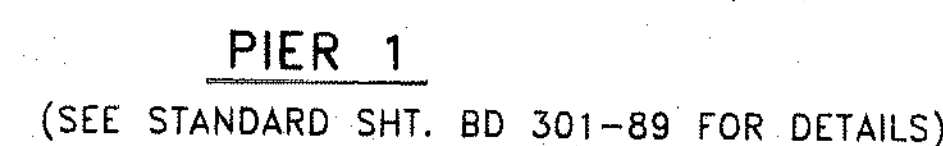
12'-0"

PROPOSED 2 #5 (29'-3" LG) (4 TOTAL)

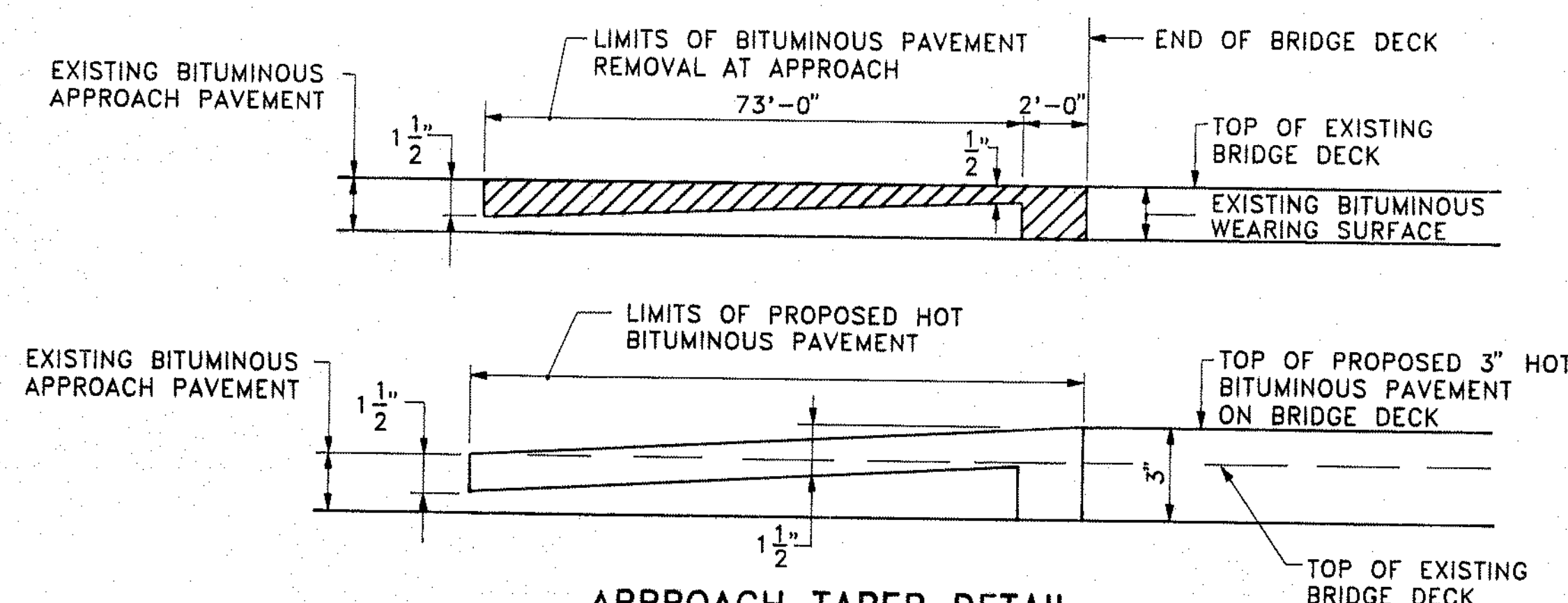
PROPOSED #4 @ 12" 9" (TYP BOTH SIDES) (54 BARS TOTAL)

X' = 1 7/8" @ 45° F

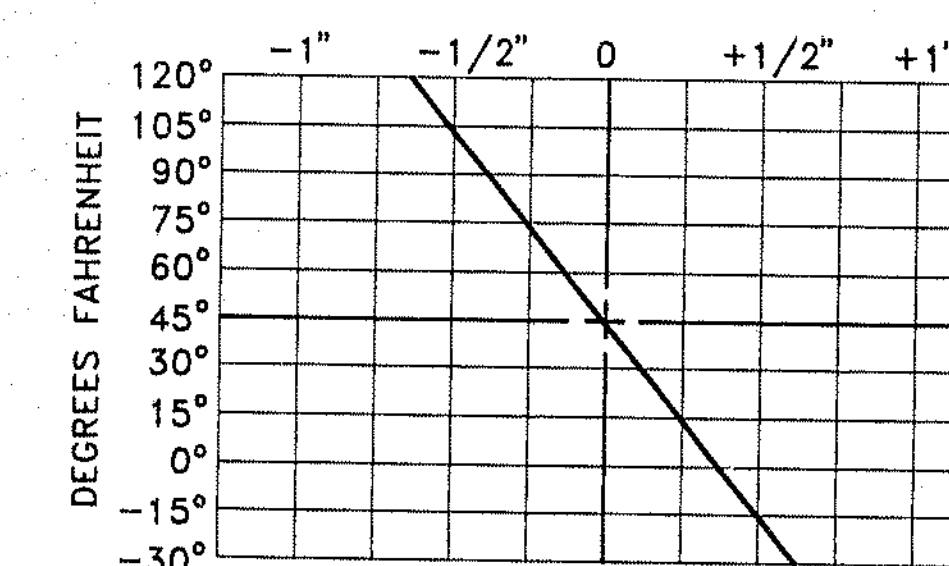
- PAINT EXPOSED ARMORED JOINT STEEL
- (*) CARE SHALL BE TAKEN BY THE CONTRACTOR NOT TO DAMAGE EXISTING REINFORCING STEEL TO REMAIN OR TO DAMAGE ITS BOND TO THE SURROUNDING CONCRETE.
- SEE STANDARD SHT. BD 301-89 FOR DETAILS.



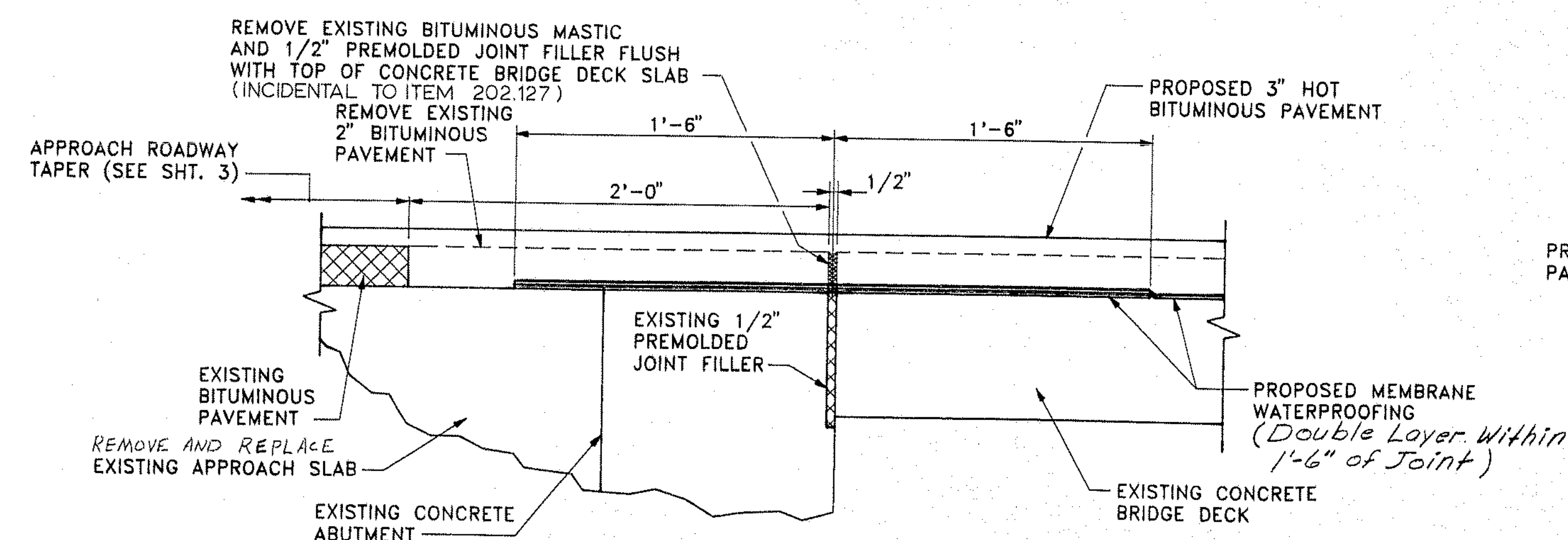
1. THE SEALS TO BE FURNISHED SHALL HAVE A MINIMUM MOVEMENT RATING OF:
PIER NUMBER 1: 1.25 INCHES
2. THE SEAL SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION OF THE JOINT ARMOR.
3. THE JOINT OPENING WILL VARY DEPENDING ON THE DIMENSIONS OF THE SEAL SELECTED BY THE CONTRACTOR. THE JOINT OPENING SHALL BE SET ACCORDING TO THE OPENING SHOWN ON THE APPROVED SHOP DETAIL DRAWINGS.
4. THE COMPRESSION SEAL ADJUSTMENT CHART SHOWS THE ADJUSTMENT NECESSARY FOR THE JOINT OPENING SHOWN ON THE SHOP DETAIL DRAWINGS FOR TEMPERATURES OTHER THAN 45°F. ADJUSTMENT IS TO BE MEASURED PARALLEL TO THE CENTERLINE OF TUTTLE ROAD.
5. JOINT ARMOR SHALL BE FABRICATED AND DELIVERED TO THE SITE IN TWO (2) SECTIONS (SEE ELEVATION, THIS SHEET). INSTALLATION OF JOINT ARMOR SHALL BE PERFORMED TO ALLOW ONE LANE OF TRAFFIC OVER THE BRIDGE DURING CONSTRUCTION. THE TWO SECTIONS OF JOINT ARMOR ARE TO BE WELDED IN THE FIELD TO PRODUCE ONE CONTINUOUS SECTIONS. WELDS ARE TO BE GROUND SMOOTH AND PAINTED PRIOR TO COMPRESSION SEAL INSTALLATION.
6. THE COMPRESSION SEALS SHALL BE INSTALLED IN ONE CONTINUOUS LENGTH EXTENDING THE FULL WIDTH OF THE BRIDGE, LESS ONE FOOT FROM THE OUTSIDE OF EACH FASCIA. SPLICING OF THE COMPRESSION SEAL IS NOT ALLOWED. A TEMPORARY INTERRUPTION OF TRAFFIC IS ANTICIPATED TO FACILITATE THE INSTALLATION.
7. FIELD WELDING SHALL CONFORM TO THE REQUIREMENTS OF AWS D1.5-88 AND SECTION 504 OF THE MAINE D.O.T. STANDARD SPECIFICATION.



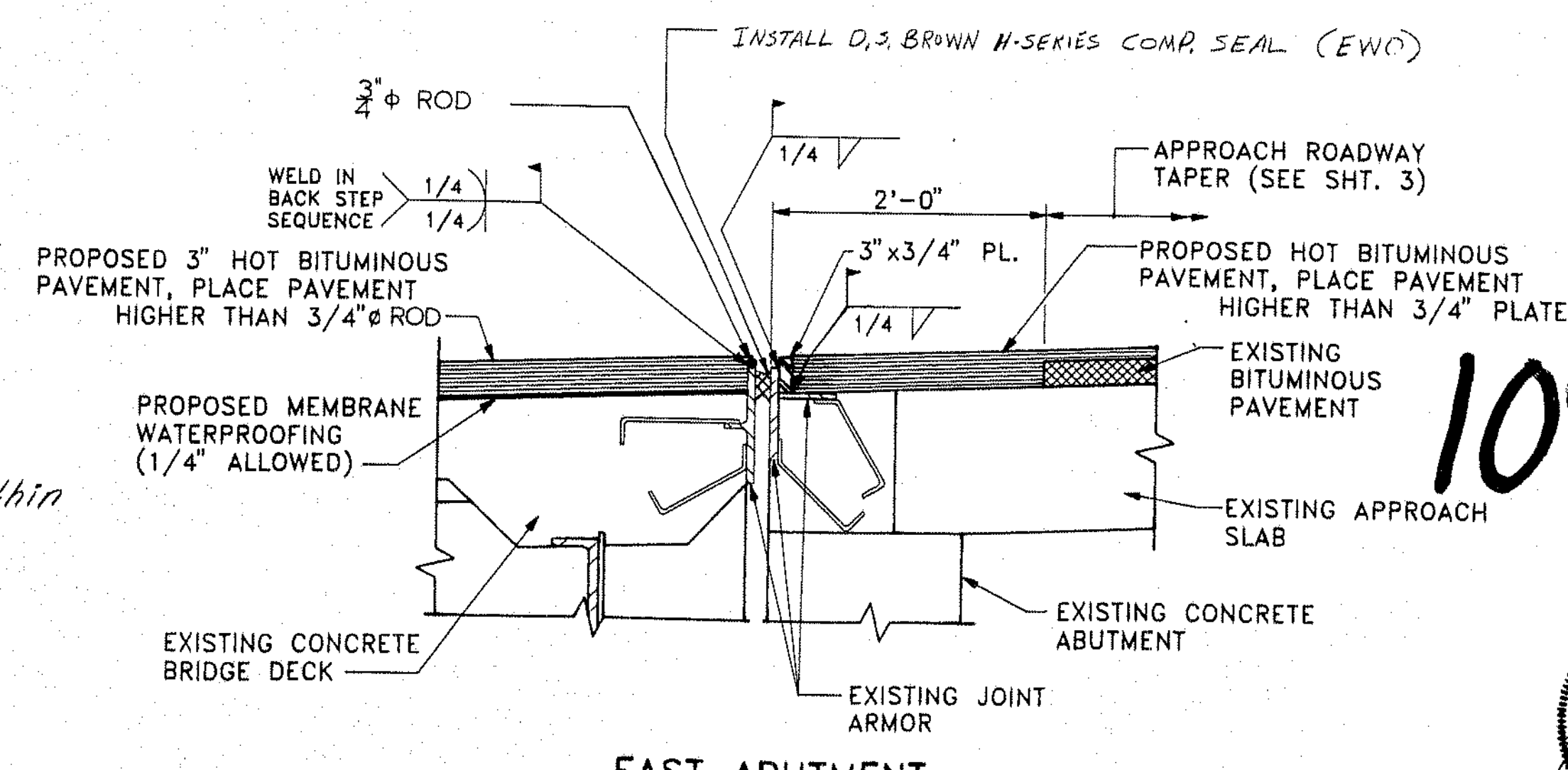
APPROACH TAPER DETAIL




COMPRESSION SEAL ADJUSTMENT CHART



WEST ABUTMENT




EAST ABUTMENT

 EXISTING CONCRETE TO BE REMOVED
 PROPOSED CONCRETE

PIN NO. 003280.00
BRIDGE NO. 5792

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

 **Kimball Chase** ONE GATE STREET
PORTSMOUTH, N.H. 03801
(603) 431-2520

JOHNSON ROAD 100

over
I-95
FALMOUTH, MAINE
CUMBERLAND COUNTY
DETAILS

SHEET 3 OF 3

AUGUSTA, MAINE

Revised As Built. *LD* 5-10-9

Appendix F

Johnson Road Traffic Model Summary

Falmouth - PM Peak Hour								
	Alternatives							
Intersections	Existing		Improved		Johnson One-Lane		Johnson Closed	
	LOS - delay	Q>Storage	LOS - delay	Q>Storage	LOS - delay	Q>Storage	LOS - delay	Q>Storage
Vehicles Denied Entry	194		0		0		1	
Total Delay	78		84		93		79	
Johnson-Middle	OK	OK	OK	OK	OK	OK	A-1.8	OK
One-Lane Johnson					C-30.7	OK		
Johnson-US1	OK	OK	OK	OK	OK	OK	A-7.2	OK
Long Woods-Middle	OK	OK	OK	OK	OK	OK	A-7.5	OK
Falmouth/Bucknam-Middle	C	EBT50 WBR95 SBL95	D-41.4	EBT50 WBR95 NBR95 SBL95	D-38.3	EBT50 WBR95 NBR95 SBL95	C-27.0	NBT95 NBR95
Bucknam-SB ramps	C	WBT50 SBT50	B-16.9	EBL95 WBT50 SBT50	B-16.1	EBL95 WBT50 SBT50	B-15.1	OK
Bucknam-NB ramps	C	SBT>>	B/C-19.5	OK	B/C-19.3	OK	C-23.2	EBL95 EBT95 WBT95
Bucknam-US1	B	EBL95	C-24.5	EBL95 NBL95 SBT50	C-21.6	EBL95 NBL95 SBT50	C/B-20.7	EBL95 EBT95 SBT95
Lunt-Falmouth	OK	OK	OK	OK	OK	OK	OK	OK
Lunt-Middle	OK	OK	OK	OK	OK	OK	OK	OK
Lunt-Depot	OK	OK	OK	OK	OK	OK	OK	OK
Depot-US1	C/B	OK	C-21.2	EBR95	C-21.2	EBR95	C-21.9	EBR95
Clearwater-US1	A	OK	A-7.4	OK	A-7.9	OK	A-8.2	EBT95 NBT95 SBT95
Hunter-US1	A-2.3	OK	A-2.3	OK	A-3.0	OK	A-3.3	NBT95
Planned and Programmed Improvements								
Long Woods-Middle			in place		in place		in place	
Bucknam-NB ramps			in place		in place		in place	
Falmouth/Bucknam-Middle								
Bold queue indicates spillback to upstream intersection								
LOS - delay based on overall intersection delay and signalized LOS scale								
Temporary treatments								
					install temporary signal			

Johnson Road User Impacts and Costs							
			Improved Falmouth Network		Johnson Rd Bridge One Lane		Johnson Rd Bridge Closed, Adjusted Traffic and Signals
PM Peak-Hour Travel							
	Vehicles Denied Entry	0			0		1
	Delay (VHT)	84			93		79
Delay Impacts							
	Peak-Hour Delay (VHT)	0			9		-5
	Daily Delay (VHT)	0			34		-19
	Daily User Costs				\$ 438		\$ (243)
Detour Impacts							
	Daily Distance (VMT)	0			0		1310
	Daily Travel Time (VHT)	0			0		37
	Daily User Costs				\$ -		\$ 851
Total	Daily User Costs				\$ 438		\$ 607
Interstate Closure User Impacts			via I-295	via US 1			
	Between Exits 10 and 15						
		speed	65	30	mph	Increase in	
		distance	3.64	3.86	miles	travel cost	
		travel time	0.056	0.129	hours	\$/vehicle	
		travel cost	0.78	1.80	\$/vehicle	\$ 1.02	

Appendix G

Traffic and Accident Data

STATE OF MAINE

INTERDEPARTMENTAL MEMORANDUM

FILE: Falmouth

Date of Request: 5/4/2016 Return: 7/22/2016
 Latest Date Needed By 5/9/2016

To: **Ed Hanscom**
 From: **Janet Damren 4-3462**
 Subject: **Request for Traffic Information**

Dept.: MDOT, Bridge Program
 Dept.: Bridge Program
 Project Manager: **Joel Kittredge**

TOWN(S): Falmouth P.I.N. **21721.00** Consultant Proj ☐
 COUNTY: Cumberland ROUTE:

LOCATION/
 DESCRIPTION: Johnson Road/I-295 bridge #5792 which carries Johnson Rover over I-295, located 0.25 of a mile west of Rt. 1.

	Roadway Changes or Relocation (Attach Sketch)	Turning Movement needed (Provide Locations under Comments)	Other Please Describe Under Comments
Please Check Box if Applicable:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Prep By: dw3

Sec. 1

Sec. 2

Sec. 3

Sec. 4

Sec. 5

Description of Sections

Falmouth -
 Johnson Road
 NW/O Harriette
 Street

1 Latest AADT (Year)	<u>1440 (2013)</u>				
2 Current <u>2016</u> AADT	<u>1440</u>				
3 Future <u>2026</u> AADT	<u>1580</u>				
4 Future <u>2036</u> AADT	<u>1730</u>				
5 DHV - % of AADT	<u>11%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
6 Design Hourly Volume	<u>190</u>				
7 % Heavy Trucks (AADT)	<u>5%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
8 % Heavy Trucks (DHV)	<u>3%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
9 Direct.Dist. (DHV)	<u>50%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
10 18-KIP Equivalent P 2.0	<u>27</u>				
11 18-KIP Equivalent P 2.5	<u>25</u>				

Notes or Remarks: 18-Kip ESALS is based on 20 year life

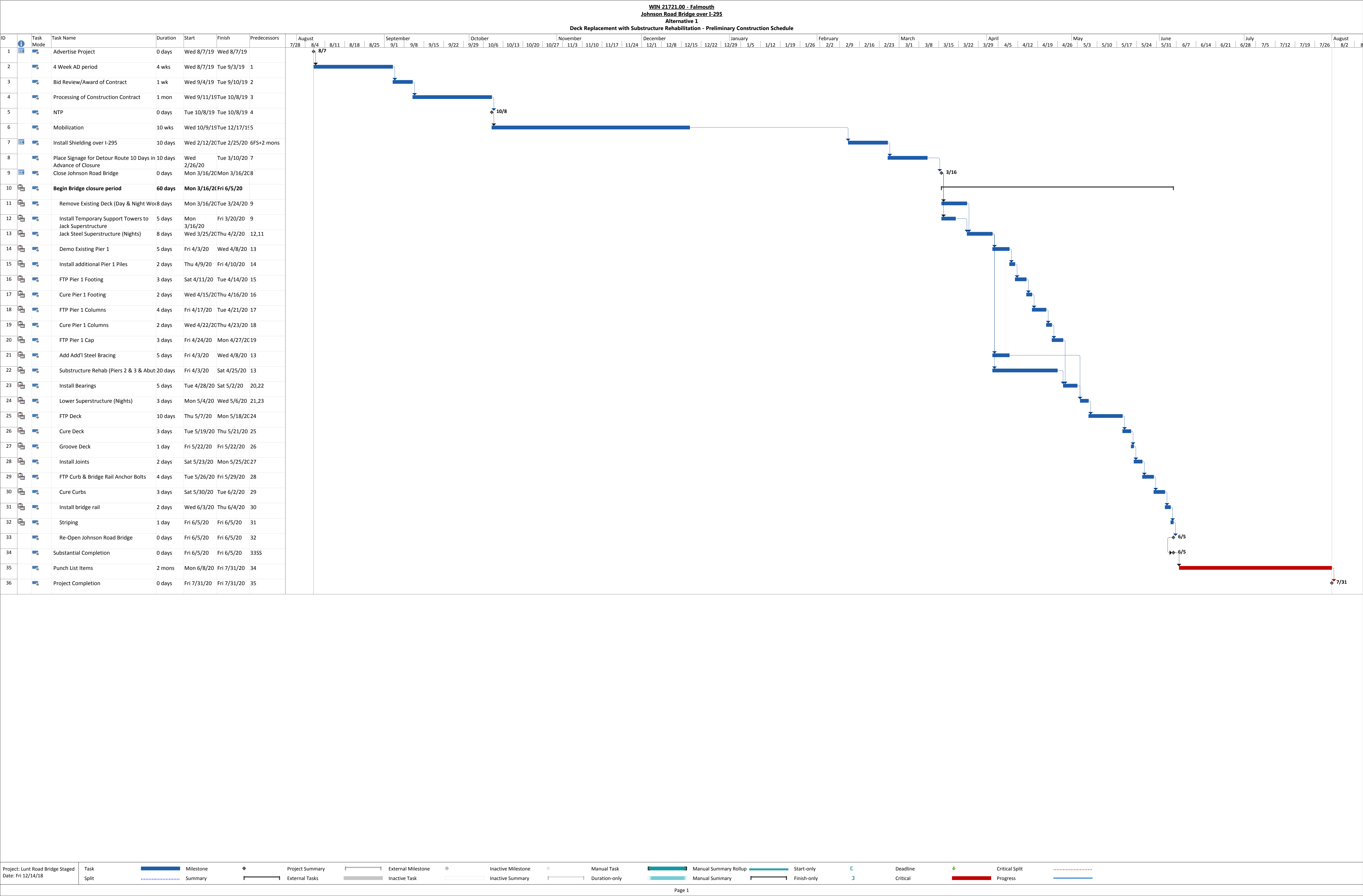
PLEASE PROVIDE: (1) PIN NUMBER, (2) THE CURRENT & FUTURE YEARS FOR WHICH YOU WANT AADT CALCULATED, AND SEND TO MIKE MORGAN. (A LOCATION MAP IS NO LONGER NEEDED.) TRAFFIC REQUESTS WILL BE FILLED ON A FIRST COME / SERVE BASIS. PLEASE SEND WHEN PROJECT KICKS OFF!!!!

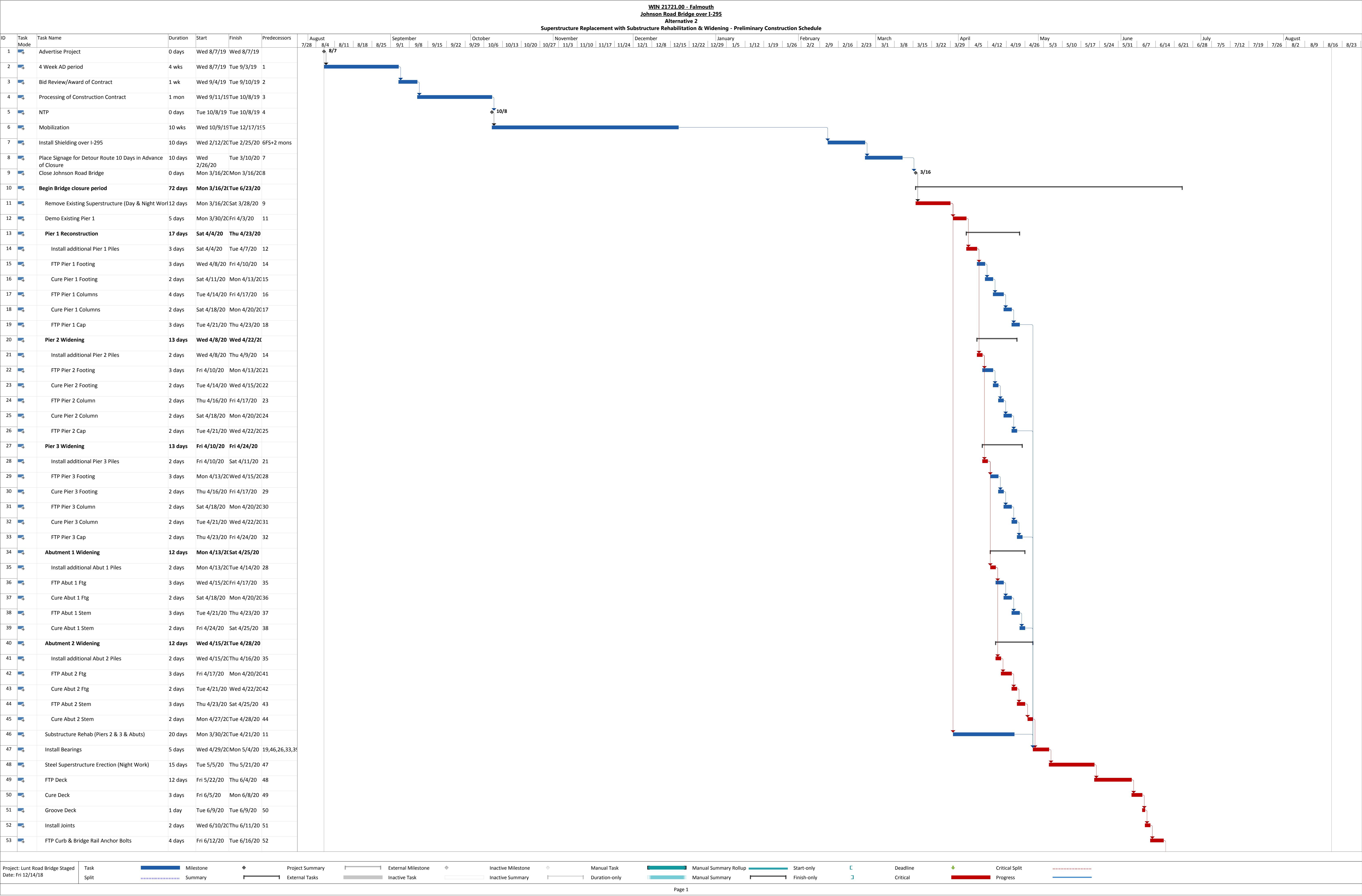
Need Only Data Items Numbered

Comments: No Heavy Truck data available. Assumed 5% Heavy Trucks.

Appendix L

Preliminary Construction Schedules





Johnson Road Bridge over I-295

Rehabilitation

	November	December	January	February
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[illegible]

Johnson Road Bridge over I-295

ment - Prelimi

December	January
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